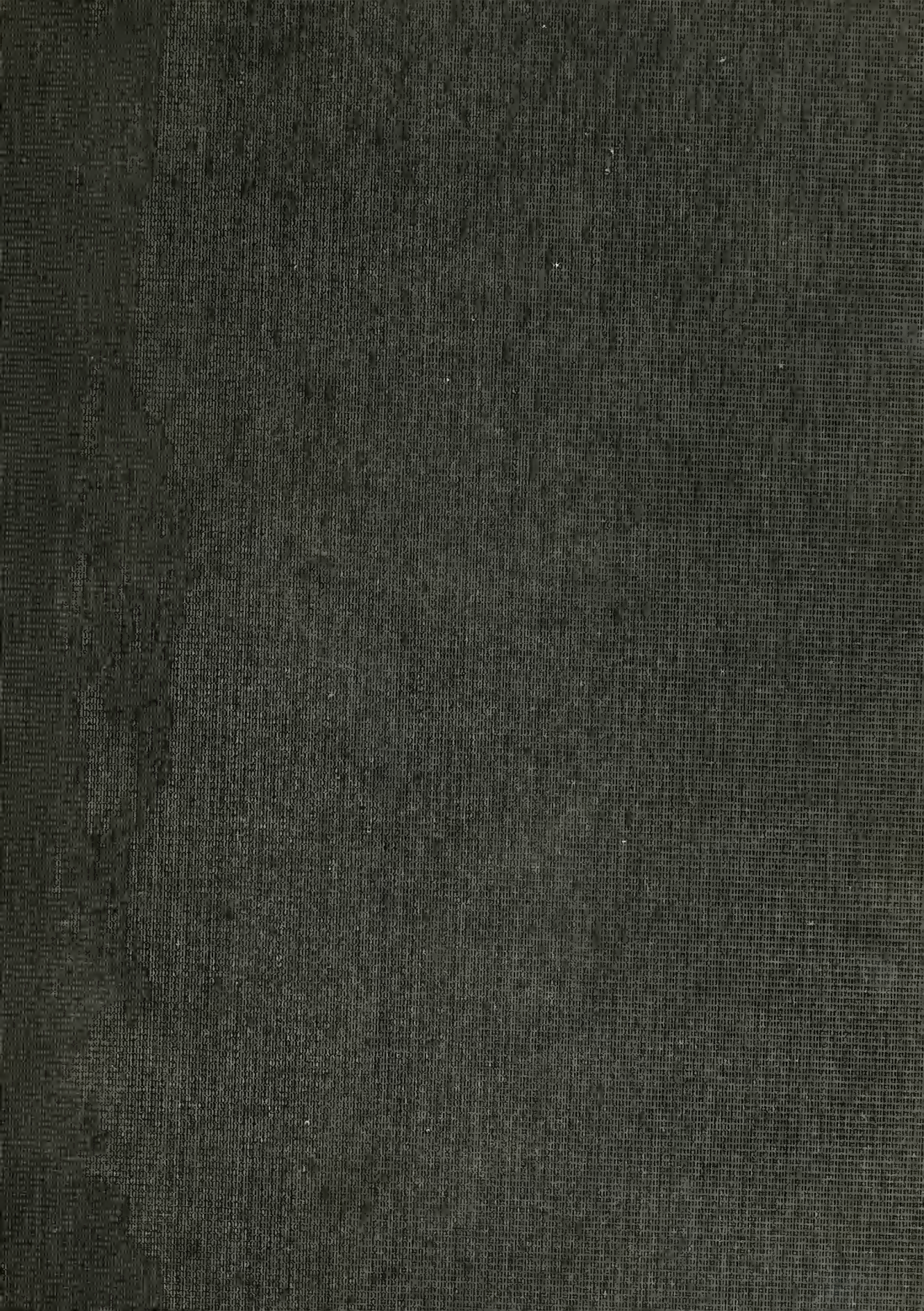




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No. 1

THE TREATMENT OF CANCER BY PHYSICAL METHODS WITH AND WITHOUT SURGERY.

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The electrical methods employed in the following series of cases were deep Röntgentherapy, fulguration (De Keating-Hart) desiccation (Clark), and diathermy (Nagelschmidt). These therapeutic agencies were combined with surgery, radium, toxins, and vaccines, when such adjuvants were indicated. The results obtained were due, not so much to any originality of method, as to the correlation of several very excellent methods, already described, but little understood, and seldom used by the profession at large. Inasmuch as we have been treating these cases only during the past ten years, sufficient time has not elapsed to warrant any final statement concerning the successful cases, other than that they are now symptomatically well.

For our purposes malignant lesions may be divided into three classes, viz., those in the first, second, and third degrees of malignancy.

1. THE FIRST DEGREE OF MALIGNANCY.

(a) Cases having superficial skin lesions tending to extend out from the skin rather than into the underlying structures. (b) Those which do not extend more than one cm. beneath the skin. These are characterized by slow growth, long duration, and a tendency not to metastasize early.

Histological characteristics. Growths of this class of malignancy in our series showed the histological formation of papillary epithelioma, basal-celled epithelioma, mycosis fungoides, and pre-epithelial keratoses.

Prognosis. The prognosis of such cases treated by the above methods is 100 per cent. good. They can be cured by physical methods, without surgery, pain, hemorrhage, opening up the lymph channels, danger of infection, implantation of malignant cells, or hospital confinement, and with the best cosmetic results.

Therapeutic methods. These cases should not be treated by cutting operations. The physical

methods indicated in the order of their preference are: (a) Massive doses of Röntgen rays; (b) desiccation; (c) radium; (d) destructive caustics, provided the more expensive equipments are not available.

If improperly treated or neglected, these cases may develop into the second or third degree of malignancy.

2. THE SECOND DEGREE OF MALIGNANCY.

(a) Those operable tumors, characterized by rapid growth, and tend to extend rapidly into the deeper structures, and to metastasize early. Carcinomata of the breast and operable sarcomata are very good examples of this class.

Histological characteristics. Growths of this class of malignancy in our series of cases showed the histological formation of basal-celled epithelioma, and alveolar and medullary carcinomata of the breast.

Therapeutic methods. (a) Preoperative massive doses of Röntgen rays; (b) thorough radical operation; (c) fulguration at the time of operation; (d) post-operative deep Röntgentherapy or radiotherapy. By the use of these adjuvants to surgical treatment, the percentage of recovery in this class of patients has been materially increased.

3. THE THIRD DEGREE OF MALIGNANCY.

Inoperable superficial and deep malignant conditions.

Prognosis. These patients, as a rule, cannot be cured by any method of treatment, and are undesirable subjects, as the ultimate prognosis is 100 per cent. bad. Despite this fact, in our series of 116 cases of the third degree of malignancy, 6 cases (5.8 per cent.) to date remain symptomatically well; 24 (20 per cent.) showed marked primary improvement after massive Röntgen ray treatment was instituted. This in itself is sufficient to demonstrate even to the most conservative that deep Röntgenotherapy has an action on malignancy which might well be called inhibitory. This inhibitory action, shown in these hopelessly advanced cases, is the same action which becomes annihilatory in less advanced cases.

Therapeutic methods. The symptoms can usually be improved by electrical methods and radium,

The results obtained in all three classes of cases have been noticeably better since the installation of the Coolidge tube. We have operated the Coolidge tube with a parallel spark gap of 10 inches, with milliamperage of 5, getting 15 X through filters of 3 m.m. of aluminum and a filter sensitized paper in 3 minutes.

The foregoing division of all cancers into three classes of malignancy, is valuable for determining both the prognosis and the treatment. Cases of the first degree of malignancy *can* be cured; cases of the second degree of malignancy *may* be cured; cases of the third degree of malignancy, as a rule, cannot be cured. The majority of cures of malignancy referred for treatment by physical methods are cases of third degree of malignancy, and this accounts for the poor results frequently obtained. Much time may be lost in cases of the second and

and six of carcinoma of the breast, all treated by a combination of massive doses of x-ray, radical operation, and fulguration, followed by massive doses of x-ray or radium. Three of these patients are still under treatment; five have been discharged symptomatically cured; and two have discontinued



Fig. 2.—First degree of malignancy.

Case of mycosis fungoides, in which the lesion on the right temporal region was treated by surgical removal and skin grafting. The lesion on the left temporal region was treated by massive Rontgen therapy. The lesions on the cheeks and neck were treated by desiccation.

treatment. All of those patients who have continued the treatment are symptomatically well, although sufficient time has not elapsed to warrant the statement that they have been completely cured.

In the third degree of malignancy we had 116



Before treatment.

After treatment.

Fig. 1.—First degree of malignancy.

Superficial epithelioma of the forehead. Complete recovery under massive Rontgen therapy.

third degree of malignancy, and the patient's life endangered, if one is deceived by the well-known superficial healing properties of radium as well as of the x-rays. The fact that lesions of the second degree of malignancy appear at first to improve, under treatment indicated only for cases of the first degree, gives a false sense of security, and results only in therapeutic procrastination, and the development of second degree cases into a malignancy of the third degree while under a form of treatment suited only to cases of first degree malignancy.

Of the first degree of malignancy, we have thirteen cases, nine of which have been symptomatically cured under massive doses of x-ray, four of which are symptomatically cured with radium, and one, symptomatically cured under the combined treatment of both massive doses of x-ray and radium.

Of the second degree of malignancy, we have a total of ten cases; four of epithelioma of the skin



Fig. 2a.—Mycosis fungoides after treatment.

The best cosmetic results were obtained by radium, desiccation, and massive Rontgen therapy. In the lesions treated by desiccation there has since been recurrence. Other mycosis lesions have appeared in other parts of the body. All these lesions are now being treated by radium or x-rays.

cases, divided into groups according to the accompanying table:

Diagnosis.	No. of Cases.	Sym'ly Well.	Im- proved.	Unim- proved.	Dead.
Epithelioma	21	0	4	10	8
Carcinoma of breast	22	1	3	9	6
Lymphosarcoma	11	1	4	3	3
Round celled sarcoma	3	0	0	2	0
Spindle celled sarcoma	3	1	3	3	1
Chondrosarcoma	1	1	1	0	0
Melanosarcoma	2	0	0	1	0
Miscellaneous sarcomata	7	0	3	3	0

Hodgkin's disease.....	5	2	3	0	2
Chronic lymphatic leukemia...	1	0	1	0	0
Carcinoma of uterus.....	10	0	2	2	2
Miscellaneous tumors.....	25	0	0	5	15
	116	6	24	38	37
Percentage		5.8	20.	32.22	32.

On account of the extravagant exploitations of radium by the profession, as well as by laymen, a statement as to the relative value of this therapeutic agent as compared with other physical methods may be valuable.

Radium has been fortunate in many respects in its exploitation. In the first place, it is so rare and expensive that it has been placed only in the hands

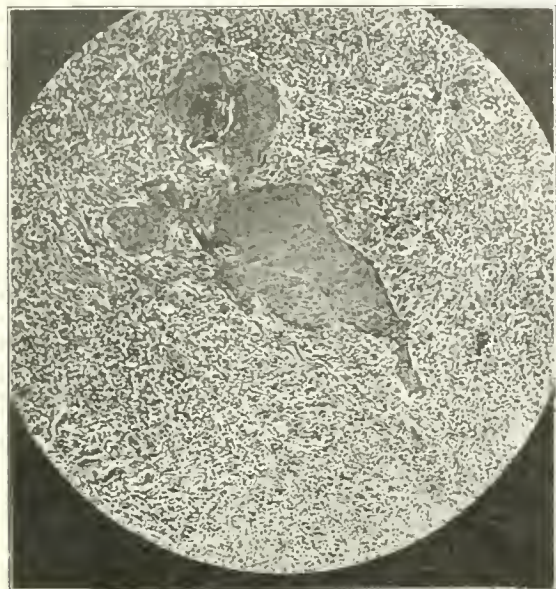


Fig. 2h.—Photomicrograph, case of mycosis fungoides.

of well-known physicians, surgeons, or scientists, who have felt in duty bound to test it extensively and report upon its properties. Their results are not nullified by a great multitude of mediocre or unreliable results promulgated by inexperienced observers who happened to have a few hundred dollars that they were willing to invest in the new agent, as was the case when *x*-ray machines were put on the market. Consequently, radium has been taken much more seriously than its predecessor in the radio-active field, the *x*-rays. Electricity of any kind in medicine is not taken very seriously by the profession as a rule, largely because of the unscientific character of the majority of men who have exploited it. It is a singular fact that the radium workers, who are more scientific as a whole, do not seem to be familiar with the therapeutic effects obtained by means of *x*-rays in efficient workers' hands. Several of the best known radium workers have pointed with pride to their results in treating epitheliomata, the various leukemias, Hodgkins' diseases and exophthalmic goiters, for in-

stance, and have shown surprise when informed that *x*-ray workers reported the same results years ago, and that successful treatment of these conditions is a routine occurrence in the practice of good Röntgentherapists. In personal conversation with



Fig. 3.—Second degree of malignancy.

Case of epithelioma of the nose in a patient suffering from extensive lupus (non-ulcerative). The tumor developed on the nose after a local treatment of the lupus with carbon dioxide snow. The epithelioma was removed surgically, the base fulgurated (De Keating-Hart), followed by massive Röntgentherapy. The lupus was treated by massive Röntgentherapy, the resistant edges being controlled by desiccation (Clark). An artificial nose has since been fitted and the patient makes a very presentable appearance.

some of the most noted radium workers in this country, they have looked skeptical, even when they refrained from expressing skepticism, when assured that *x*-rays properly administered will control all the symptoms complained of in exophthal-

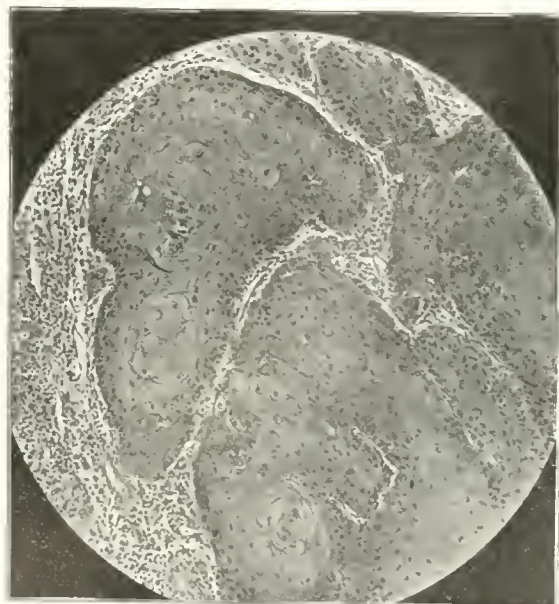


Fig. 3a.—Photomicrograph, case of epithelioma of nose.

mic goiter except exophthalmos, and that the blood counts and lymphatic enlargements in leukemias and pseudo-leukemias can all be controlled at least temporarily. These results are established facts attested by numerous authentic references in medical

literature. Whether these results obtained by radium will be more permanent than those obtained by x-rays cannot be stated at the present time, as the radium cases are too recent to warrant any conclusion. There really should be little or no rivalry between these two agents at the present time, as they are similar agents that can be used as tremendous assistants in the surgical relief of cancer.



Fig. 4.—Third degree of malignancy.

Case of primary lymphosarcoma of the tonsil, involving the cervical glands. Treated at first by toxins with slight, if any, improvement. Within forty-eight hours after the first massive dose of deep Röntgentherapy, the size of the tumor had diminished fifty per cent. Under the combined treatment of toxins and x-rays, the patient steadily improved to the condition shown in the "after treatment" illustration. He subsequently relapsed and failed to respond to any treatment. This is commonly the history in cases of lymphosarcomata, Hodgkin's disease, leukemia, and allied conditions, i. e., marked primary improvement progressing often to apparent recovery, but, as a rule, these patients die sooner or later of the condition despite all changes in the technic, including raying of the long bones. In this class of cases every effort should be put forward to make permanent the initial good results.

In comparing the relative value of the various physical methods, six points may well be considered:

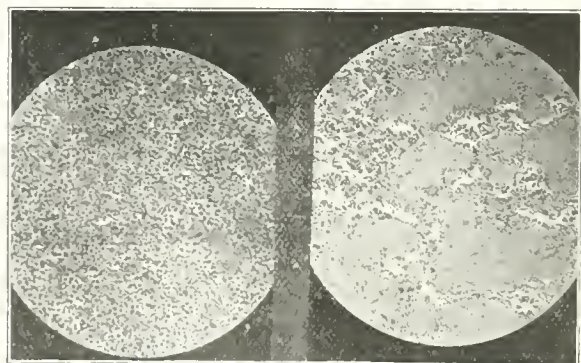


Fig. 4a. Photomicrographs. Case of lymphosarcoma of the tonsil and metastasis.

1.—COST.

Radium is far more expensive than any of the other methods. Massive x-rays, electric desiccation and ultra-violet rays come next in expense. Surgery and caustics are the cheapest.

2.—EASE OF APPLICATION.

As to ease of application, much depends upon the training of the individual who administers the treat-

ment. Each therapist will naturally do the best work with the greatest ease by employing that agent with which he is most familiar. Other things being equal, radium and caustics are easier to apply than the other agents in question.

3.—TIME CONSUMED IN TREATMENT.

Radium applications are much longer in duration than any of the other methods. They require hours while the other treatments require minutes.

4.—PAIN.

Radium, x-ray, and ultra-violet light treatments, cause no pain. Electric desiccation and carbon dioxide snow cause slight pain. Surgery and cauterization are very painful and require a local anesthetic. Chemical caustics are the most painful.

5.—COSMETIC EFFECTS.

Cosmetic effects are best after radium, x-rays, ultra-violet light, desiccation, and carbon dioxide snow, and poorest after surgery or cautery.



Fig. 5.—Third degree of malignancy.

Case of myxolymphosarcoma. Extensive tumor of the right thigh and large mass, filling half of the abdomen on the left side. It was impossible to remove all the tumor tissue from the thigh at operation, and no surgical removal of the abdominal mass was attempted. Post-operative deep Röntgentherapy caused the complete disappearance of all evidence of both the tumor masses. In this class of patients a regular system of prophylactic treatments should be instituted to guard against recurrence. (Since this was written, the patient has returned with a recurrence in the thigh. As yet there is no evidence of a return of the abdominal tumor.)

6.—DANGERS.

With a proper technic there are no dangers in any of these methods. Poor technic is a de facto contra-indication for the use of any agent, for it will need the combined energies of the advocates of both forms of radio-activity to persuade the surgeons of today to admit that there is any efficacy in either method.

The electric cautery of Percy seems to have made some impression on the surgical mind, but the virtues of desiccation, diathermy and fulguration are hardly known and seldom practiced by surgeons. It is to be hoped that the propaganda of radium, associated with the timely invention of the Coolidge tube, will call to the attention of the medical profession the value of electrical methods. This can hardly result in a large vogue for these methods unless championed by prominent surgeons.

MALIGNANCIES OF THE GASTRO-INTESTINAL TRACT.

The only hope for the relief of internal growths is to diagnose them in their incipency. By the proper use of the Röntgen rays, a positive or negative diagnosis of carcinoma or ulcer of the gastro-intestinal tract can be made in the earliest stages of the involvement. Furthermore, its size, shape, and position can be determined, painlessly and without shock or danger. This accurate information affords an opportunity for the early and successful removal, by surgical operation, of the cancer or ulcer bearing area, moreover reducing the time re-

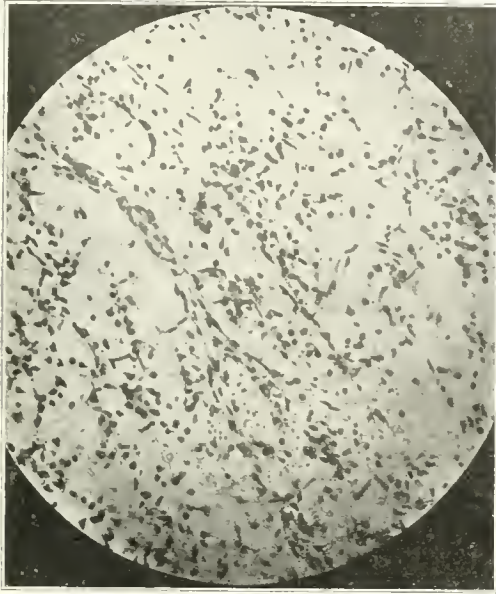


Fig. 5a.—Photomicrograph of case of myxo-lympho-sarcoma.

quired for surgical examination and operation, and consequently the amount of shock entailed, so that the percentage of recoveries after surgical removal is increased.

The problem of handling malignancy to-day resolves itself, therefore, into:

1. The proper treatment of external cases of the first degree of malignancy, lest they develop into cases of the second and third degree of malignancy.
2. Increasing the palliative effects possible for external tumors of the second and third degrees of malignancy, so that they may be regarded as actually remedial.
3. The diagnosis and early surgical removal of ulcer-bearing areas and malignant conditions of the gastro-intestinal tract in their incipency.

CONCLUSIONS.

1. Incipient surface cancers can be cured: (a) if *superficial*, by physical methods; (b) if *deep*, by physical methods and surgery.
2. The physical methods employed include mas-

sive x-ray doses, desiccation (Clark), fulguration (De Keating-Hart), diathermy (Nagelschmidt), and radium.

Beginning cancer of the gastro-intestinal tract can be diagnosed with accuracy by recently improved x-ray methods.

4. Advanced cancer, either internal or external, cannot be cured by any known method.

5. The successes herein reported are due not to the discovery of any one new factor, but rather to the combined application of the best and most effectual electro-physical technic, both in early diagnosis and prompt treatment, the results of which, if permanent, are invaluable.

6. The methods herein advocated are very costly.

I am grateful to the members of the Commission and the staff of the General Memorial Hospital for their co-operation, and particularly to my assistants in the electro-physical department for their faithful and painstaking work.

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RETENTION OF URINE IN INFANTS.

Retention in the newly born babe may be due to one of several causes for which, when a doubt exists, the infant should be examined: (1) Imperforate meatus urinarius, either glandular or preputial; (2) marked phimosis simulating imperforate preputial meatus; (3) cyst of the sinus pocularis; (4) impacted mucus or calculus within the urethral canal; and (5) atresia.—T. C. STELLWAGEN, JR., in *The Pennsylvania Medical Journal*.

THE CHOICE OF INCISIONS IN HAND INFECTIONS.*

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In this paper only infections of the palmar aspect of the hand will be discussed. Infective lesions involving the dorsal surface are infrequently encountered.

I have examined the literature of hand infections, and find only three contributions of importance published during the last ten years. First, and of greatest value, is the classical monograph of Kanavel, of Chicago, "Infections of the Hand" (edition, 1914), to which I am indebted for many of the data here presented. Second, is an article by White, of England, which appeared in the *London Lancet* a few months after publication of the first edition of Kanavel's monograph. White's article is extensively quoted by DaCosta in his recent book on surgery. The third contribution is by a Frenchman, Picque.

The subject of hand infections is so extensive that my remarks will be principally confined to one phase, *i.e.*, the sites of the several incisions which will best drain the infected hand with the least damage to the other tissues. Furthermore, I shall discuss only acute and subacute infections that involve the tendon sheaths and fascial spaces of the palmar surface.

To briefly review the anatomy of the palmar tendon sheaths: Those of the index, middle and ring fingers extend from the base of the terminal phalanx to "Kanavel's line," *i.e.*, a line drawn between the radial end of the proximal phalangeal crease and the ulnar end of the distal palmar crease, roughly a thumb's breadth above the web. These sheaths pass near the proximal interphalangeal joint, and this fact may account for its more frequent involvement than the metacarpophalangeal joint from which the sheaths are well separated. The sheath of the flexor longus pollicis pursues relatively the same course, excepting that nineteen times out of twenty it does not terminate at the root of the thumb, but continues upward into the radial bursa, which in turn extends to a point one inch above the annular ligament between the pronator quadratus and the flexor tendons. The little finger sheath imitates its fellows until it reaches the hand. From this point in about half the cases it extends into the ulnar bursa, which also passes above the annular ligament upon the pronator quadratus, "hugging" the ulnar side of the super-

ficial and deep tendons of the wrist with prolongations extending between them. In approximately half the instances a communication exists between the radial and ulnar bursae.

Four fascial spaces are embraced within the scope of this paper: The first is what may be called the terminal phalangeal space—the site of felons. This space is composed of the fatty cushion at the finger end, and is divided into numerous compartments by fascial bands which extend roughly from bone to skin. Alongside of this space are the blood-vessels that nourish the shaft of the terminal phalanx, and obstruction of the blood supply by pressure explains the frequent necrosis of that portion of the bone in felons. Next are the web spaces, *i.e.*, those between the fingers. Infection in this loose tissue may extend to the dorsum, to the adjacent fingers, or along the lumbrical muscles to either of the two spaces to be next described. These, the thenar and mid-palmar spaces, may be best described together. They occupy the palm below the tendons and lie upon the interossei and adductor muscles. The third metacarpal bone indicates the point of their separation, excepting at the wrist, where at times the two spaces communicate. Below, these spaces are continuous with what may be called the lumbrical canals. Above, the mid-palmar space terminates near the annular ligament, upon the pronator quadratus. The deep palmar arch is dorsal to these spaces, whereas the superficial arch is palmar to them. Infection may occur in all of these spaces and tendon sheaths, or in any one of them singly. More often, however, the patient is seen only after the infection has invaded other sheaths or spaces.

In order to properly locate the necessary incisions for drainage, it is important to understand just what combinations are likely to be encountered. Terminal phalangeal infections tend to become localized, unless neglected, when the infection may extend either by the fascial spaces to the web, or upward along the tendon sheath, both of which will be specifically mentioned later. Infections of the sheaths of the index, middle and ring fingers may rupture through the skin. The proximal interphalangeal joint is frequently involved, with subsequent necrosis of the middle phalanx. Most often, however, rupture occurs at the proximal end of the sheath, the pus gravitating into the finger web and thence by way of the lumbrical canal to the thenar space if the index finger be involved, and to the mid-palmar space where the middle and ring fingers are implicated. Rarely does middle finger infection invade the thenar space. Little finger infec-

*Read before the Society of Physicians and Surgeons of Louisville, November, 1914.

tions behave in like manner, where the sheath is not connected with the ulnar bursa, otherwise the infection rapidly extends to the forearm under the profundus. Thumb sheath infections invade the forearm through the radial bursa. Pus in the thenar space may invade the mid-palmar space, and *vice versa*. In either event the webs are prone to involvement by way of the lumbrical canals. Pus in the mid-palmar space oftentimes invades the forearm. Web infections may rupture anywhere upon the dorsal or the palmar surface. Both the thenar and mid-palmar spaces are frequently infected. To illustrate the structures which may be infected in regular sequence, I may mention that inflammation of the little finger sheath may extend to the ulnar bursa, to the mid-palmar space, to the radial bursa, to the thumb sheath, and the thenar spaces, each in turn becoming involved. Distally, the finger webs may be infected with possible rupture upon the dorsum. Proximally, the infection may pass upward along the forearm, under the profundus and over the pronator quadratus, and still further extension in the connective tissue of the forearm around the vessels and nerves probably explains the paralyses and trophic changes which supervene in certain cases.

The foregoing comprise the more frequent structures invaded. In addition there may occur osteomyelitis of any of the bones, invasion of the wrist joint, rupture of the mid-palmar space through the dorsum, and a host of other complications.

In operating upon a felon, Kanavel advises a lateral incision, supplemented at times by a counter opening. Thus he claims to more thoroughly divide the fascial bands which traverse the terminal phalangeal space, and also avoids placing the scar on the palmar surface. Babcock (*Journal of the A. M. A.*, June 14, 1913), from personal experience with this incision, states that the sense of touch is impaired, and recommends the time-honored median incision. Dorrance (*Journal of the A. M. A.*, May 10, 1913) "goes Kanavel one better" and joins the distal ends of two lateral incisions around the end of the finger. I have never used this latter incision. Certainly the old median incision left something to be desired, in that it oftentimes had a tendency to prematurely close. In my experience the Kanavel incision has given entire satisfaction, especially when two openings are made, and I have had no complaint of impairment in tactile sense.

Infections of the sheaths of the first, second and third fingers should be attacked from the side. The incisions are made upon the lateral palmar

aspect of the two proximal phalanges, and if the infection is severe these incisions are joined over the proximal interphalangeal joint. The sheath should be freely opened by extending the incision the full length of the infected area. This holds true even over the joint, but in such cases the finger must be dressed in extension to prevent tendon prolapse. White warns against incision over the joint for fear of tendon sloughing. This has not been my experience, if the finger is properly dressed.

Infections of the little finger sheath are treated as described in the foregoing paragraph. One must carefully ascertain whether infection has extended to the ulnar bursa, and if not that structure must not be exposed. It is advisable to proceed from the known infected area to the unknown, for, as Kanavel suggests, the hitherto uninfected sheath even if opened first would probably become contaminated from the lymphatics. I believe White's method of aspirating the sheath before opening, so lauded by DaCosta, is only of theoretical value. If the ulnar bursa is involved, it should be incised through the palm on a director to the ulnar side of the sheath. If the infection has invaded the forearm, the incision may be carried around the uncinat hook and the annular ligament may be sacrificed if necessary. Kanavel advises this in some instances, and states if the wrist is dressed in extension no harm results. Probably a better procedure would be to terminate the incision at the distal border of the annular ligament, and drain the space under the profundus tendon at the wrist into which sheath the ulnar bursa is almost certain to rupture. This is accomplished by incising the wrist on the lateral palmar aspect of the ulnar above the joint. Forceps are introduced so that all structures save the bones and the pronator quadratus are palmar to them, and a counter opening is then made upon the radial side. If the infection has extended further upward, invading the forearm around the ulnar vessels, it may be attacked by an incision between the ulna and the flexor carpi ulnaris.

Thumb sheath infections must be opened along the proximal phalanx and through the thenar muscles to a point one thumb's breadth distal to the lower border of the annular ligament. The reason for terminating the incision here is to avoid dividing the motor nerve to the thenar muscles. As the upper end of the radial bursa is always infected and usually ruptures, it must be drained by lateral incisions in the wrist which lead to the "anterior wrist space" already described. Kanavel warns against

mistaking subcutaneous collections of pus upon the anterior aspect of the wrist of lymphatic origin, for the more important pus pockets under the tendons. Drainage of these spaces will not drain the anterior wrist space.

The frequency with which infections of the little finger and thumb sheaths and their respective bursae are associated induced Picque (*Journal de Chirurgie*, October, 1913) to make four incisions, one each along the little finger and thumb, one from the root of the little finger to the radial side of the uncinat hook, and one from the root of the thumb to the base of the thenar eminence. If the infection extends above the annular ligament, he makes two incisions, one on either side of the flexor tendon group which lead downward to the upper ends of the ulnar and radial bursae respectively.

Web infections are treated by incisions upon either the dorsal or palmar aspect of that structure, or by splitting the web. The superficial transverse ligament at the distal border of the hand may be divided without danger, but the deep interosseous ligament must be spared to preserve the integrity of the hand. On the palmar surface the incision may be extended to the Kanavel line, which is distal to the superior arch. As web infection so often extends along the lumbrical canals, the incision should be located over the lumbrical muscle. This has an added importance in regard to the webs of the middle, ring and little fingers, as the mid-palmar space is almost certain to participate in their infection, and the best way to drain this space is by passing forceps through the incision around the dorsum to the lumbrical muscle and thence into the space, as suggested by W. C. Dugan in 1906.

The thenar space rests immediately upon the transversus adductus, and the shortest route thereto is by incising the dorsum of the index-thumb web just radial to the middle of the index metacarpal bone and level with its palmar surface. Forceps are made to pass along the palmar aspect into the thenar space, but never beyond the middle metacarpal bone for fear of infecting the mid-palmar space.

The method of attacking infection of the upper ends of the ulnar and radial bursae and the anterior wrist space recommended by White (*Lancet*, February 24, 1906) is interesting. Severe infection of the ulnar bursa, which is usually found ruptured, he opens by a lateral ulnar incision which drains the anterior wrist space. He makes no counter radial opening as does Kanavel. Less severe ulnar bursa infections (unruptured) he drains by an opening between the flexor tendon and the flexor

carpii ulnaris in the same manner as Picque. The radial bursa he finds less often ruptured into the anterior wrist space, and instead of completing the rupture and draining the space as recommended by Kanavel, he drains anteriorly between the radial artery and the flexor carpii radialis. If he fears pressure upon the artery, he excises one inch of the vessel and covers the stumps. He avoids the ulnar side of the flexor carpii radialis for fear of pressure upon the median nerve. Kanavel mentions this point of drainage, but prefers to rely upon the lateral wrist incision.

Picque does not recognize the spaces designated by Kanavel as the thenar and mid-palmar spaces. He deals with palmar abscess as a whole and drains through two incisions which begin near together at the proximal end of the adductor crease and radiate distally, one being directed toward the web between the little and ring fingers, and the other toward the web between the index and middle fingers. Such incisions must sever the superior palmar arch, and furthermore the pus is drained through the tendon group. The first of these incisions opens the mid-palmar space, but how much better is Kanavel's method of drainage—over the involved lumbrical canal, away from the tendons and distal to the arteries. The second Picque incision opens the inner end of the thenar space. Kanavel drains by a shorter route, traversing the tissue of the dorsum—the usual site of overflow when the thenar space ruptures. Furthermore, by the latter method injury to the palmar structures is avoided.

Although the scope of this paper does not include specific methods in the treatment of hand infections, I cannot forego the mention of a few general points, with the correctness of which I had become convinced before reading the monograph of Kanavel so frequently quoted herein.

(1) In operating for hand infections a general anesthetic should be employed. In uncomplicated felons this rule may sometimes be disregarded.

(2) Make the field bloodless by the employment of a suitable tourniquet.

(3) For drainage use gutta percha tissue (not tubes) or gauze saturated with balsam of Peru and oleum recini. Kanavel recommends gauze impregnated with vaseline.

(4) As a rule wet dressings are continued too long.

(5) The operation should be slowly performed, the various structures being identified as encountered, remembering that the procedure is not so simple as the opening of a boil.

PAINLESS CHILDBIRTH IN FRANCE: A NOTE UPON THE USE OF TOCANALGINE.

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In 1847, a few months after the discovery of ether, Deschamp in Paris wrote an article entitled "Ether in a Case of Application of Forceps," and in the same year Dubois wrote on "Application of Ether in Labor." So from the very earliest days France was alive to the need of easing, wherever possible and safe, the pains of childbirth. In 1854 appeared articles on chloroform in labor from the pens of Pajot, of Perrin, and many other Frenchmen. The "Sleep à la Reine" was much in vogue after its discovery by Simpson, of Edinburgh, especially after he had used it when royalty was in labor.

In 1878, Pinard wrote a most elaborate and able monograph entitled "The Comparative Action of Chloroform, Chloral, Opium, and Morphine on Women in Labor," and most of his deductions still hold. He felt that chloral was of little value, and that while morphine was frequently useful its results were not as satisfactory as those of chloroform. Chloral stopped the labor every time; morphine only at times.

In 1885, Doleris, working with Dubois, attempted the local use of cocaine in solution and in salves applied to the genital tract, to make labor less painful, but with little result.

Later Tuffier and Malartic and others tried spinal cocanization in obstetrics. But aside from its dangers the anesthesia lasted only two hours. Shortly after, stovaine was discovered, and that, too, was used intraspinally, but it in turn had to be discarded.

When Kroenig and Gauss first reported their results with scopolamine and morphine, Le Lorier working on the service of Dessaignes, tried this method with the same difficulties that confronted many others at that time,—difficulties due, I should say, to the fact that the Freiburg recommendations were not followed in detail and also to the instability and unreliability of the drug, as then prepared.

But the great need of something to alleviate the sufferings of childbirth and to encourage a possible increase of the birth rate in this age being ever present in France, Prof. Ribemont Dessaignes of the University of Paris gladly sought the opportunity to try tocanalgine when the virtues of that drug were proclaimed by the chemists Laurent and Paulin.

This drug is obtained by the action of living ferments on the chlorhydrate of morphine. The living ferments resemble those used in beer leavening. Morphine is almost entirely transformed into a substance which crystallizes in a very regular way. So we see that the drug closely resembles the oxydimorphine of Marne; it seems to be a product of hydration and hydrogenation of morphine. But, strangely enough, it possesses not one of the chemical reactions of morphine itself and is only one-fifteenth as toxic.

It was in July, 1914, that Prof. Ribemont Dessaignes reported to the Paris Academy of Medicine his results with tocanalgine. He tried it in 112 cases without a single bad result. The drug acts on the nervous centers of the brain and sympathetic system where it is brought from the point of injection by the circulatory system. The pains disappear in from 3 to 15 minutes after the administration of the drug; rarely it takes 30 minutes. As a rule the patients sleep between pains but are easily aroused by asking them a question. Those who do not sleep are apt to be excited and talkative and, though conscious of uterine contractions, they perceive no sensation of uterine pain. Eighty-four of his 112 patients had complete analgesia. Twenty-four of the women, finding sufficient relief from one injection, refused further treatment, though they still had some slight pain. Only four very nervous women seemed refractory to the drug. Though they claimed that they had no relief, their complaints and screams became less noisy.

The length of the analgesia is very variable, the extremes being 30 minutes on the one hand to 12 hours on the other. There was not a single ill effect on the mother during labor or the puerperium; and though the hysterograph showed the uterine contractions to be unaltered, the second stage of labor was somewhat lengthened, probably due to the lessened use of the abdominal muscles following the injections. Often in cases of rigid cervix the first stage is shortened.

The 112 labors resulted in 115 babies, 77 of whom at once cried out; 28 were born dazed, like Cesarian section babies, but they had good color, regular forcible cardiac action, normal reflexes. This meant that after a little artificial respiration they would all breathe normally and they did. One child died during labor, but the fetal heart sounds were inaudible on admission to the hospital. All others, after respiration was established, had the same chances as other new-born infants.

This drug tocanalgine is given in doses of $1\frac{1}{2}$

ccm. for the first injection and $\frac{1}{2}$ to $\frac{3}{4}$ ccm. for succeeding doses.

Due to existing international conditions I could obtain only a small quantity of this drug to date and have so far tried it in only three cases with the following results:

All three patients were primiparæ—one was 36 years old. Two cases received 2 injections, one case 3 injections. Unfortunately, all three were given pituitrin. Two of the patients were entirely relieved of suffering, one very much relieved.

One mother suffered from thirst and frequent micturition. There were absolutely no other untoward symptoms in the mother during labor or puerperium. The women were not exhausted at the end of labor, the uterus involuted promptly, convalescence was in every way smooth, the flow of milk was as it should be. There were no headaches, nausea or vomiting or other uncomfortable sensations, at any time. The second stage of labor was certainly prolonged in all three cases. It does not seem that the uterine contractions were stopped, but they were certainly lessened in frequency and intensity, necessitating, as I have stated, or at least so my house gynecologist thought, pituitrin in the three cases.

One baby cried out at once, one took 4 minutes to cry out and one 8 minutes. But after that they all did perfectly well and at the end of the twelfth day left the hospital weighing more than at birth.

In conclusion let me say a few words comparing this "tocanaline obstetrique" with scopolamine-morphine. They both act on the central nervous system. Tocanaline works in 15 minutes; scopolamine takes 1 to 3 hours to establish amnesia. Both fail in a small percentage of cases. Both are harmless to the mother in labor and puerperium. Both prolong the second stage of labor, but if this prolongation is not excessive it is rather a benefit than a harm. Both cause oligopnea in a certain number of babies, but that should not deter us from the use of either drug. Though I am delighted with the results I have obtained to date in over 30 cases of "twilight sleep," I would welcome a drug that was just as safe to mother and child as scopolamine-morphine, and easier of manipulation. In the Freiburg method the memory test, not always easy to employ, must be the main guide and must be repeated every few minutes and the mother and child must be constantly watched. With tocanaline the return of pain means that the effect of the drug has worn off and the patient needs another injection, and the first or a repeated dose can be given near the end of labor, as it works promptly

and promises rapid relief. Although my three cases were not everything to be desired, they were much more successful and much more encouraging than were the first attempts in the method of Kroenig and Gauss.

2 WEST 86TH STREET.

TRANSFUSION OF BLOOD—SOME RECENT OBSERVATIONS.*

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Much has been written about blood transfusion. Many attractive theories have been advanced. Interesting articles have appeared, from time to time, dealing with almost every phase of the subject, especially of technic, and describing new instruments, some of which are so complicated and so stamped with the genius of the inventor as to be of little practical value to the busy general surgeon.

Although the indications for transfusion are numerous, it must be that new conditions will continue to arise, as we come to understand the blood more fully. By the introduction of new blood into the veins, some persons, though suffering from an incurable malady, have no doubt been given a few months longer to live, notably so in pernicious anemia and in the anemia of malignant disease. I have seen both these conditions apparently benefited by transfusion, but it must be done early, and repeated if necessary. Transfusion for acute infections in plethoric individuals is unwarranted. Long-standing infectious processes, attended by anemia, show improvement in some instances. The action of transfused blood in these cases is still theoretical. There is good reason to believe, however, that it increases phagocytosis and raises the opsonic index.

Not all anemic individuals are good subjects for transfusion. Each case must be carefully studied, especially as to the heart condition. If the second sound of the heart is not easily defined, and the pulse thready and irregular, one should transfuse cautiously, if at all. Accidental hemorrhage, for which we would perform a transfusion, sometimes occurs in the presence of certain constitutional conditions—diabetes, leukemia, nephritis—in which the heart muscle has been rendered unable to withstand the strain incident to sudden increase in the volume of the circulation. In case of fatal hemorrhage, death is probably not due to loss of blood *per se*, but rather to rapid deterioration of the heart muscle, the heart dying along with the rest of the body

*Read before the Syracuse Academy of Medicine, November 17, 1914.

from lack of nutrition. We must not forget, also, that hemorrhage is sometimes beneficial. Some of our superiors still remember the magic effects of venesection, as practiced years ago. These splendid results were due largely to relief of tension upon the vasomotor centers, giving to the heart muscle a period of respite from fatigue. In the presence of marked blood impoverishment, and in great reduction of the blood volume by acute hemorrhage, the danger of hemolysis should not be overlooked. Hemolysis occurs in something like 25 per cent. of cases, and yet a long and extensive experience may not encounter a single instance. It is a mark of good surgical judgment, however, not to transfuse unless the blood of both individuals is found to be compatible. Some years ago when the study of the circulation was creating new interest, the opinion was held that death from hemorrhage was due to a sudden diminution in the quantity of blood and not to loss of red corpuscles, that no matter how sudden or severe the hemorrhage, the loss of serum was invariably out of proportion to that of the cellular elements, there being always enough red cells left to carry oxygen to the tissues, and furthermore, on such occasions, the mere introduction into the veins of sufficient normal saline solution to restore equilibrium would also save life. We know now, however, that while this theory was largely correct, it did not express the whole truth. There are instances in which, after serious loss of blood, saline instillation fails to save life. The heart rallies for a short time, it is true, only to again lose its grip. Something else is needed. Whole blood seems to supply this need. After abortions in tall, slender, relaxed individuals, with the uterus empty and hemorrhage persistent, sometimes for days, transfusion acts unusually well. Of course, there are other effectual means of treatment. But transfusion controls the hemorrhage by shortening the coagulation time, and supplies new blood.

By far the greater number of transfusions is done for some form of anemia, in which the patient's circulation has been either suddenly depleted by hemorrhage, or more gradually effected, as in the stillbirth of uterine fibroids, persistent epistaxis, hemorrhage of the newborn and frequent attacks of hematemesis. Then there is the group of cases in which some disease or foreign substance has altered the character of the blood. In this group are the malignancies, cirrhosis of the liver, illuminating gas poisoning, pernicious anemia and hemophilia. Besides these more common conditions, all of which have responded to transfusion, another indication is found in those diseases of obscure pathology of

which idiopathic epilepsy is an example. The patient's circulation should first be depleted by phlebotomy. If one will transfuse these cases occasionally, perhaps twice a year, and note the effect, he will find that many of them will be relieved of epileptic seizures for a number of months each time. Since there is, as yet, no cure for epilepsy, transfusion ought to be tried. This applies more particularly to the individual case, in which there is a desire to relieve domestic tension and improve the environment. In institutional work, where hundreds of cases are treated, transfusion would hardly be feasible.

Like all other surgical procedures, methods of doing transfusion will continue to multiply until one or more are perfected which combine simplicity with rapidity and safety. Crile's method is used extensively. Brewer's tubes have given satisfaction. McGrath's rubber bulb apparatus should receive further trial. The same author's forceps-canula seems very simple in its application, but here again the matter of turning back a vascular cuff is tedious and often difficult. None of these methods provide any special means for measuring the blood. While it is not necessary to be so accurate about the amount transfused, yet it would seem best to operate within the limits of safety, noting carefully the effect. Some patients require only small amounts; others, more. A slender person should be selected as donor, if possible, whether arterial or venous blood is to be used. Healthy relatives are to be preferred, for legal as well as social reasons. Section of the radial artery, while exposing the donor to a slightly longer convalescence, is quite devoid of danger, only a small incision being necessary, when the simple canula, presently to be described, is used. Results are more certain also because of the driving power of the heart back of the column of blood. Of course, when an artery is severed, instantly its walls contract and retract, a wise provision of Nature in controlling hemorrhage. But this is offset by the fact that venous blood clots more readily than arterial, the coagulation time being shorter. The more tedious the process, anyway, the greater are the chances of failure.

In the *New York State Journal of Medicine*, July, 1911, I described a method of direct transfusion, with a simple means of measuring the blood. Since then I have used this method in a considerable number of cases with very good results. It is effective, quickly applied and requires only a reasonable amount of dexterity. However, when the donor is a stout individual with a large wrist, as is too often the case, there is some difficulty in making the artery

reach the vein without undue tension. On this account, I conducted a series of experiments to determine how this could be overcome. Without going into a close description of the many devices in use, it is safe to say that the two disturbing features which have occupied the attention of experimenters everywhere are hemolysis and early coagulation of the blood. The disposition of the first is in the hands of the operator. Evidently, many surgeons believe that whatever contrivance is used to convey the blood from one individual to another, its inner surface must, in some way, approach in character that of the living vessel (Crile), or be lined with paraffin, herudin or some other protective substance (Brewer, Percy, Satterlee and Hooker). While this may be desirable, I have not found it to be an absolute necessity. The great trouble with many of the finely adapted instruments for transfusion is that their application often is not possible in every case on account of inability to procure them. Lack of assistance and of skilled hands, also, being important considerations. Consequently, many persons, greatly in need of transfusion, are deprived of its beneficent influence.

After a number of tests covering all these points, I found that arterial or venous blood will flow almost indefinitely through an unlined rubber tube or a combined metal and rubber tube, if air is excluded and the conducting medium is kept at the body temperature by means of hot saline sponges; also, that blood collected from the canula does not coagulate any more readily than if taken directly from the vessels, the same conditions prevailing in both instances. Mere contact with a foreign substance, therefore, is not the main feature in the production of clotting. Exclusion of air and gentle manipulation are likewise essential. Paraffin seems to be unnecessary. As a matter of fact, the blood forms its own lining, as effectually protective as paraffin, by rapidly coating the inside of the tube with serum. This can be demonstrated by opening a tube through which blood has been passing for some seconds. The serum which adheres to the tube does not seem to favor coagulation, nor does it show a tendency to break up into particles to be carried along as emboli. On the strength of these findings, I now use two small canulae connected by a piece of rubber tubing (fig. 1). The flexible rubber connection permits of rapid and more accurate adjustment.

We learned, however, that several things are necessary for easy and satisfactory work. The entire tube, or transmitter, should be as short as possible, not over five inches, and free from sharp

curves and angular processes. A long tube (Aveling) means failure. When ready to make the anastomosis, the blood should not be exposed to the air, the vessels and tube having been kept warm and covered by hot saline sponges. Air does not easily penetrate a wet sponge. If blood is to be collected in the small graduate for estimating the amount to be carried over, it requires but a few seconds, after which the tip of the canula is wiped off and the hot sponges re-applied. The caliber of the tube should compare well with that of the vessels to be used. A very small tube produces too much tension, and one of large caliber permits undue commotion, of the blood stream, both of which favor fibrin formation and clotting.

The parts having been cleansed, the artery and vein, or both veins, are dissected clear and kept warm by moist sponges. Nerve fibers are carefully avoided. Provisional ligatures are thrown around the vein and artery in order later to fix the canula, and close the vessels when through. The artery is then severed, its distal end clamped or ligated, and the canula inserted and tied in. While the blood is flowing into a hot sponge, the vein is opened and the other end of the canula introduced and fixed. When the vessels used are both veins, they need not be divided. For obvious reasons, their distal and proximal segments, respectively, are connected with the canulae. The anastomosis should be made quickly and with the slightest amount of traumatism. Air must be excluded. Even while the vein is being opened for the second canula, the artery, or other vein, should bleed into a hot sponge to prevent coagulation. The tip of the canula is wiped off before insertion.

We still employ the "spurt" method, referred to previously, to determine the amount of blood used. It is estimated in this way: When ready to make the connection, a small sterilized graduate is provided and the blood allowed to spurt into it till the drachm mark is reached, or any other point which may be decided upon. If five spurts are required to fill the graduate to the drachm mark, each spurt will contain twelve drops. A pulse of eighty, therefore, will discharge two ounces of blood a minute. This quite simple device is also sufficiently accurate. A trifling allowance is made for loss during the operation.

Arterial hemorrhage is a continuous flow, characterized by sharp, spurt-like exacerbations, due to systolic force modified by vascular tension. Blood coming from a vein has a long, open, undulating curve, comparable to a very slow pulse. The estimation, in

either case, however, can be made as above described.

There is no mystery about blood transfusion, although blood itself is a rather mysterious fluid. We analyze it, and determine pretty well the nature of its many constituents, but its physiology is not clear. No one knows just how it is that the same blood stream, rushing on like a mighty torrent, is equally able to construct bone and muscle, and to keep alive and keenly active the delicate brain cell. Hence the question has been raised as to the final destiny of blood transfused, whether it undergoes change, or immediately fulfils all the require-

ments of the patient's own circulatory medium. In our experiments we could find no particular alteration except a tendency to enrichment. The recipient's blood, examined before and after transfusion, showed, in the latter instance, only an increase in normal constituents. I also tested a mixture of the two bloods, patient's and donor's, at the body temperature, both before and after transfusion, with the same results, except in the cases of pernicious anemia; here, of course, the abnormal elements remained in evidence. From my more recent work along this line, I have reached the following conclusions:

(1) That blood may be carried from one individual to another through unlined metallic or rubber tubing, maintained at the body temperature, without danger of clotting, if the anastomosis is made promptly. Long exposure of the field to the air and tedious manipulation are to be discouraged. The tube must be kept scrupulously clean. The blood serum adequately lines the tube.

(2) That the amount of blood passing over from the donor to the recipient may be accurately determined by knowing the donor's pulse rate, and the quantity discharged by a series of ventricular contractions.

(3) That the field of application should be enlarged to include any condition which might be benefited, even to a small degree. All things considered, the indications for transfusion may be left to the judgment of the operator, who should know something of bloodvessel surgery.

(4) That, in the absence of hemolysis, blood, after transfusion, is immediately taken up by the recipient and utilized as blood. If any change occurs, it is a gradual one, which has not, as yet, been determined. Further study of the blood is greatly needed.

(5) That our experience with whole blood preferably arterial, has been so satisfactory, that we have not often had to resort to the more complicated process of defibrination.

(6) That the method to be recommended is the one which requires the fewest assistants, creates the least excitement, fulfils the desired purpose and can be applied with the slightest disturbance to the blood contents.

(7) That blood transfusion is not, strictly speaking, a cure for any pathological condition, but rather a therapeutic help to other means of treatment. Its indication may even be replaced, occasionally, by saline instillation. Yet, there have been times when, death being imminent, when transfusion has seemed to be the one link in the chain of events without which a life would surely have been sacrificed. We, therefore, cannot take the unusual position held by some and dispose of transfusion as a useless procedure, nor vie with the enthusiastic worker, and recommend its practice too freely; but, with an open mind, as if searching for truth, we should carefully consider each case, in full view of the fact that blood is a complicated tissue about which there is yet much to be learned.

(8) That transfusion of blood is not devoid of danger; and while frequent performance improves the dexterity and skill of the operator, it does not relieve him of the peculiar responsibility which attends this apparently trivial operation.



Fig. 1.

ments of the patient's own circulatory medium. In our experiments we could find no particular alteration except a tendency to enrichment. The recipient's blood, examined before and after transfusion, showed, in the latter instance, only an increase in normal constituents. I also tested a mixture of the two bloods, patient's and donor's, at the body temperature, both before and after transfusion, with the same results, except in the cases of pernicious anemia; here, of course, the abnormal elements remained in evidence. From my more recent work along this line, I have reached the following conclusions:

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A CONSIDERATION OF THE ANTISEPTICS USED IN THE TREATMENT OF IN- FECTIONS OF THE GENITO- URINARY ORGANS.

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Infections of genito-urinary organs occur from different sources and from different causes, and in consequence there are different kinds of infections. Gonorrheal infection is the most common, the most persistent, and often the starting point of urinary troubles. Other infections occur, frequently, however; for instance, in chronic cystitis, between the enlarged folds of an inflamed mucous membrane through the irritation of an alkaline urine, ulcerations are found which are very easily infected. The infection may be brought by continuity to the ureters and to the pelvis, causing pyelitis and pyelonephritis. An enlarged prostate is the cause of congestion of the mucous membrane of the bladder, and it often contains infectious materials in all degrees of inflammatory process, causing and spreading infection.

The infection may be limited to one part of the genito-urinary apparatus, or it may spread to the whole apparatus, from the urethra to the kidney.

Many pathogenic bacteria are found in the urinary tract, which, according to R. Kraus,¹ can be divided into two groups: In the first group are: 1, bacterium coli; 2, proteus Hauser; 3, staphylococcus pyogenes; 4, streptococcus pyogenes; 5, gonococcus Neisser; 6, tubercle bacillus; 7, bacillus typhi. The second group consists in the bacillus pyocyaneus, diplococcus Fraenkel and Weichselbaum, and some anaerobic bacteria referred to by Albaran and Cottet. In some cases those bacilli which in the normal circumstances are saprophytes do not produce any trouble, but in the presence of pathological alterations may become of a pathogenic influence, staphylococcus ureae (Rovsing), staphylococcus and micrococcus liquefaciens, flugge diplococci Bastianelli, and many others, which in some circumstances more or less will produce infection in the urinary organs.

Infection often is carried from outside by the introduction of instruments in the urethra either not at all or not sufficiently sterilized. In many cases the instruments, although perfectly sterilized, may stir up mucus or muco-pus in the posterior urethra and cause infection.

When a urethra has been infected with gonorrhea, this condition has much greater influence in the production of other infections.

Infections may occur by the way of the lymph and of the blood. In these cases pathological bacteria, which are found in those fluids, when carried to an hyperemic or inflamed mucous membrane of the urinary organs, may find good ground for their development in the mucous membrane itself and in the residual urine. The lymphatics from the intestines in close proximity to the urinary organs may carry a rich mess of bacteria and produce infection. Colon bacillus in urinary infections is more frequent and much more stubborn than at first considered. Adams² referred to sixty cases of infection of the urinary tract where colon bacillus was present. The results of this infection is bacilluria, which often causes pyelitis, chronic cystitis, and at times, pyelonephritis. On account of the stubbornness of these bacteria, there is a tendency to relapse, and more often to recrudescence.

The most important point before the treatment of infections of the genito-urinary organs is the prevention. When the rules of asepsis are strictly enforced infection can be avoided. When, however, we are in the presence of infection, it must be treated. We make use of two kinds of antiseptics, those which are taken by the stomach (internal antiseptics) and those which are used locally to wash and to cleanse the mucous membranes (local antiseptics).

The general internal antiseptics are those which, administered by the mouth and excreted with the urine, produce such a change as to convert it into a germicidal fluid. Salicylic acid has been used for many years, and more especially its derivate salol, which is still used with good results. Salol, decomposing in the upper intestinal tract into salicylic acid and carbolic acid, is thus absorbed and excreted in the urine, rendering it antiseptic.

On account of its being hard on the stomach, salol has been replaced by urotropin, which has today just attained great popularity. It is hexamethylene tetramin $[(CH_2)_6(NH_2)_4]$ and is obtained from ammonia and formaldehyde. Although having antiseptic properties, it is non-poisonous and non-irritant. It was introduced into urological practise by Nikolaier under the commercial name of urotropin. From the same base, combined with other antiseptics, we have helmitol (Bayer), and borovertin, when combined with boric acid; hetralin, cystopurin, cystogen, aminoform, are all the same thing under different names. All come from the same preparation and have in common the property to set free formaldehyde in the urine, which disinfects the urinary tract. In small doses it prevents the production of bacteria, while in

large doses it destroys those already existing. To a certain extent, hexamethylenamin has been recommended as diminishing pain and also as a uric acid solvent. Camphoric acid has also been proposed as a urinary antiseptic, and it has been combined with hexamethylin-tetramin in a preparation that has been recently highly recommended by Remete⁴ as much more effective in producing disinfection and producing no irritation. In a series of cases where the urine was foul and full of bacteria, after using this drug it was found not altered and the bacteria were greatly diminished.

So far, at the present time, urotropin is the exponent of a large series of urinary antiseptics. Pfoundler and Schlossmann consider it a sovereign remedy for cystitis and pyelitis. Indeed, in chronic cystitis in the second stage together with the local treatment hexamethylenamin, as internal disinfectant, finds its right indication. Holt praises urotropin as an important remedy in the treatment of phosphaturia in children of all ages.

Thompson claims that urotropin alone is not so well tolerated, but associated with benzoate of sodium is much more effective. Indeed, Thompson, Still, Pardoe, and others, in cases of infection from bacillus coli, have not much confidence in the value of hexamethylenamin and they recommend the use of alkalies. In those cases where hexamethylenamin had been of great benefit, it had been administered in association with potassium citrate. Moreover, it is usually much more effective in chronic urinary infections than in acute cases, where the use of alkalies, antipyrin, salol, and the old chinin have proved of great value.

The use of the vaccines, especially in the gonococcic and colon bacillus infections, has been greatly praised. In my experience it requires much more study, and many more accurate observations.

The most reliable treatment for the genito-urinary infections is the local treatment, by means of irrigations or instillations, with local antiseptics. Irrigation is a powerful means to combat infections in the urinary tract. It is necessary to recommend perfect asepsis for the instruments and for the fluid to be injected, which has to be boiled before using.

By means of a Janet irrigator one can send into the bladder large quantities of an antiseptic solution, without any necessity of inserting catheters. If we do not need to send the fluid into the bladder, the application can be limited to the urethra by filling the canal, securing an even distension; when the inflow is stopped the fluid leaves the urethra by its contraction.

In my practice I am using, in cases of acute

cystitis, irrigations with 2% solution of biborate of sodium; with its mild alkalinity it dissolves the mucus, cleanses the mucosa, diminishes the irritation, and at the same time has antiseptic properties. In many cases it is found useful in bladder irrigations, as it has no irritating property.

Where more powerful antiseptic applications are required, potassium permanganate is an excellent antiseptic. It is a powerful oxidizing agent because of the ready disengagement, in the presence of oxidizable matters, of a portion of the oxygen of the permanganic acid. By this property it promptly destroys fetor and putrid materials. In solution of from 1 to 5000, to 1 to 3000, it has a light claret wine color. When injected in these strengths into the bladder and the posterior urethra it is soon changed and is expelled as a grayish dirty fluid. The muco-purulent secretion is coagulated and is expelled as masses of dirty brownish strings. In my practice a mild solution of potassium permanganate has been found the most effective to combat infections of any kind. Formaldehyde in solution from 1 to 1000, to 1 to 500, is frequently used for irrigations with good results.

Picric acid, with its derivate picratol, has been used in solutions from 1 to 1000, to 1 to 500, in inflammatory gonorrheal urethritis, and in cystitis. It is an astringent and also a mild antiseptic. The results, however, have not been such as to warrant its use.

Aluminum acetate has been pointed out by Dr. Koll⁵ as a useful antiseptic, especially in colon bacillus infection. With a series of experiments on the colon bacillus series and on the staphylococci, he could prove the bactericidal action of the drug in the strength of 2 per cent. solution. Clinically it gave good results in his cases; and in my service in two cases of severe chronic infectious cystitis, irrigations with 2 per cent. acetate of aluminum gave the most satisfactory results.

For instillations I have used solutions of 1 to 3 per cent. protargol, but more often of 20 per cent. argyrol. With an Ultzmann syringe only a few drops of argyrol are instilled in the prostatic urethra. Argyrol has a powerful coagulating property, and by it the muco-pus is coagulated in thick, stringy masses, which are easily removed by irrigations. Silver nitrate is also highly praised, but it is very irritant and painful, and in the ordinary cases argyrol gives good results.

Bichloride of mercury I find very irritating, even at the dose of 1 to 50,000. At this dose in my patients it has not produced any discomfort at the moment of the irrigation, but after a while it was fol-

lowed by severe pain and vesical tenesmus, and I have entirely abandoned its use. A great many of the recommended antiseptics under different trade names have as their base bichloride of mercury and it is better to be on guard in their use.

In concluding a short review of the modern antiseptics it must be said, again, that no antiseptic will have much value unless means to remove the source of infection are used. A good drain is obtained by the catheter left permanently in the bladder. A catheter left permanently in the bladder, draining infected urine, diminishes and removes fever, if present, and its beneficial effects are seen also in the ureters and on the renal pelvis. Through the catheter the bladder and the urethra are washed with the disinfectant solutions.

The removal of infected secretions from the prostate and from the spermatic vesicles by means of digital massage is often of great benefit, as in those organs infections are maintained and the urine spreads infection to the bladder and to the other parts of the genito-urinary tract. Likewise, if strictures are present, they must be dilated or cut.

As stated above, in cases of deep infection, the old stand-by, chinin (quinine), surpasses any other internal antiseptic, and repeated irrigations with solutions at different strength of potassium permanganate excel any other local applications.

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POPLITEAL SUPPURATION.

Pus escapes easily from the posterior chamber of the knee-joint along the azygos vein into the popliteal space. In the popliteal space it is shut in by the dense, tough popliteal fascia which forms a roof over it, causing it to travel by the way of least resistance up to the thigh under the hamstring muscles and down the leg under the gastrocnemius. The overlooking of the escape of pus or any infective material from the knee-joint into the popliteal space is very easy and its results, owing to its deep extensions, are very disastrous, often leading to the loss of the limb or to pyemia. I would strongly urge that it is better to make even an unnecessary incision in the popliteal space than run the risk of overlooking this escape.—EDRED M. CORNER in the *J. A. M. A.*

HEMORRHAGE FROM MIDDLE MENINGEAL ARTERY DUE TO TRAUMATISM; HEMIPLEGIA, MOTOR APHASIA; OSTEOPLASTIC FLAP FOR LIGATION OF VESSEL; RECOVERY.*

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Intracranial hemorrhage from rupture of the middle meningeal artery or its branches, due to traumatism, is a condition demanding serious consideration which the surgeon must be prepared to meet when least expecting it.

The diagnosis is not difficult if one has a clear history of traumatism and is able to watch or elicit symptoms from the time of injury until manifestations of cerebral compression are apparent. Occasionally, though, patients suffering from this condition are brought to the hospital with little or no evidence of trauma to the skull, in a state of stupor or coma, that many of the facts of the preceding history that might lead to an interpretation of the cause of the symptoms cannot be elicited. Fortunately for the patients, the physical signs, namely, effects of cerebral compression, which demand operative intervention, are so characteristic that they hardly admit of error.

A violent injury to the skull sufficient to cause a laceration of any of the intracranial vessels is generally followed by symptoms depending upon the situation and extent of the extravasation. This extravasation may be intracerebral or extracerebral. If intracerebral it may involve important centers and cause rapid death without giving symptoms of compression. If extracerebral, due to extravasation from the middle meningeal artery or its branches, a peculiar and characteristic sequence of symptoms follows the traumatism, namely: 1st, concussion; 2nd, free or conscious interval; 3rd, focal symptoms; and finally, 4th, symptoms indicative of general pressure such as (a) stupor, (b) unconsciousness, (c) slow pulse, (d) rise in blood pressure, (e) respiratory symptoms.

The focal symptoms are commonly at first irritative, shown by twitching of the face or arm due to the situation of the hematoma, generally over the lower end of the Rolandic area where the centers for the face and arm are situated. Furthermore, if the hemorrhage is on the left side motor aphasia is another characteristic sign.

Besides, from a laceration of the middle menin-

*Presented before the Surgical Section of the N. Y. Academy of Medicine, December 4, 1914.

geal or its branches extradural hemorrhages may take place from injury to the veins, sinuses, perisinoidal sinuses or emissary veins, the symptoms depending upon the amount, the site and the effects of pressure of the extravasated blood. The symptoms of pressure resulting from extravasation of blood may be of insidious or of rapid onset. The manifestation of compression occur when the extravasation has attained sufficient size to compromise the brain in the cavity of the cranium. When the extravasation takes place slowly there is a time—the free or conscious interval—which may be of short or long duration before symptoms of compression manifest themselves. Great importance must be attached to this classical and typical conscious interval between concussion and onset of symptoms of compression, as it is one of the most characteristic signs we have of middle meningeal hemorrhage.

On the other hand, the extravasation may be so rapid that coma occurs almost immediately without a free interval. The irritative symptoms may progress to those of local paralysis of the same centers and if the clot is large enough to extend to the centers of the lower extremity, which are situated higher up on the hemisphere, hemiplegia may result. This, however, is extremely uncommon. Cushing states that "instance of actual hemiplegia from an extradural hemorrhage must be rare, since the centers or the lower extremity lie so far away from the primary point at which an extravasation of this sort is likely to arise that a clot large enough to implicate the upper ridge of the hemisphere would in all probability either lead to such deep coma that symptoms of hemiplegia could not be appreciated, or else would cause death before they were apparent."

The patient whose case is here presented had a lesion of this type, of which there are not many recorded.

In spite of the progress made in the localization of cerebral affections there are some conditions in which it puzzles the operator to decide upon the exact place to open the skull. To determine the particular branch of the middle meningeal artery, anterior or posterior, which has been injured, is almost impossible, although schemes have been devised for finding points of election (Krönlein) for trepanation in hemorrhages from the different branches, should such be diagnosed. One can obviate this difficulty and uncertainty by making a large osteoplastic flap with its center over the main trunk. This seems quite rational, as it affords an excellent view for exploration for hemorrhage from

the main trunk of the artery as well as its branches. With such an opening we can lift the brain and thereby expose the middle fossa of the skull, thus giving a good view for basilar inspection and removal of clots. In elevating the brain, there need be no fear, as the opening in the skull is sufficiently large to admit of dislocation of the brain with little danger of compression effects.

To one conversant with all the details of cranial surgery such a radical method is without danger and no more serious than exploration of the abdominal or any other cavity of the body. By following this plan in quite a number of cases we find this procedure a most efficient one for lesions in the fronto-temporal or tempo-parietal regions.

A male, 45 years of age, was admitted to my service at the Lebanon Hospital on October 11, 1914, with the history that two hours before, while watching a baseball game, he was accidentally hit with a ball. After being struck he felt dizzy, but quickly recovered therefrom and walked to his home, where after an hour he became unconscious, and the whole right half of his body, including his face, was found completely paralyzed. He had vomited a large quantity of dark material. When brought to the hospital there was a small hematoma over the left parietal region, but no depression could be felt. The right half of his face was smooth and lifeless. The left pupil was markedly dilated and did not react to light or accommodation. The right upper and lower extremity were paralyzed. Knee jerks, Babinski reflex, and ankle clonus were present on the right side. The left upper extremity was negative. On the left side the knee jerk was present, but only slight ankle clonus. The patient was unconscious. Lumbar puncture revealed sanguinous cerebro-spinal fluid under increased pressure. The pulse was slow and irregular. Respiration stertorous. Blood pressure 220 m.m. The history and classical train of symptoms, namely, traumatism, concussion, free interval, then compression symptoms, were typical of a rapid and large extradural hemorrhage, due probably to laceration of the middle meningeal artery or one of its branches. Accordingly a horseshoe incision was made in the left temporal region down to the bone. The skull was trephined in four places and the openings connected by means of the Gigli saw. The osteoplastic flap was dislocated downwards and a large clot, the size of the palm of the hand and over an inch in thickness, was removed. A fissure-fracture of the temporal bone was found close to the base of the skull. The bleeding was coming from the main trunk of the middle menin-

geal and it and a small vessel on the dura were ligated. The hemorrhage from these vessels was checked. The brain was seen to pulsate. There was no subdural hemorrhage over the exposed area, still there was considerable blood welling up from beneath, probably from laceration of some emissary veins, although no distinct point of hemorrhage could be discerned. The brain was gently lifted and considerable clots removed from the base of the skull. The space was gently packed with iodoform gauze to check the persistent oozing; the osteoplastic flap was replaced and the scalp was loosely sutured.

Forty-eight hours later, under narcosis, the old incision was laid open, the osteoplastic flap again reflected and the packing carefully removed. There was no more oozing. A small rubber tissue drain was inserted underneath to the base of the brain and brought out through one of the trephine openings. The flap was replaced to the original site and scalp permanently sutured. The rubber tissue drain was removed on the seventh day, when the wound was found healed by primary intention.

It was very interesting to watch the fall of the blood pressure during the operation. As soon as the bone flap was elevated the blood pressure gradually decreased so that when the operation was completed it had fallen from 220 m.m. to 110 m.m.

The clot was so large and thick that when it was removed one could plainly see the depression left in the region of the brain occupied by the hematoma.

On recovery from the stupor the motor aphasia and hemiplegia were markedly in evidence. From the time of the second operation these manifestations gradually disappeared, so that at the end of two weeks they were hardly noticeable. The patient was then discharged, fully recovered except for a slight headache.

The early operative intervention—about six hours after the injury—no doubt was the most important factor in this recovery. Had the hemorrhage continued and the clot extended so as to compress the important centers of the medulla, the outcome would not have been so successful. Indeed, one week later in an almost similar case, where I performed the same operation for an almost identical lesion, the outcome was not so favorable, as the hemorrhage was so rapid and the clot so extensive that the patient died six hours later from compression of the medullary centers. The autopsy showed a large clot underneath the base of the brain pressing on the medulla oblongata.

The prospects of relief from a hemiplegia due to

epidural hemorrhage are in inverse relation to the time elapsed from the traumatism to the operation interference, because the sooner the pressure on the delicate nerve centers is removed, the better chance of permanent recovery from the hemiplegia.

35 EAST SIXTY-FIRST STREET.

AN OPERATION FOR THE ELONGATION OF BONE.

REPORT OF A CASE.

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The normal asymmetry of the lower extremities is about one-half an inch. The difference is in favor of one side about as often as it is of the other, though most tables find that the right is the longer.

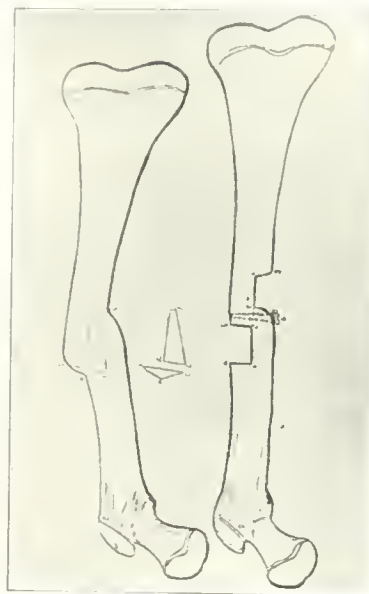


Fig. 1.

The pelvis tilts and compensates for even a greater difference between the two sides. From these facts we may conclude that the loss of an inch on the longer side when this was the longer by half an inch before injury, does not interfere with a good result, provided the fragments have united in line, since the normal difference has been preserved. However, one-half an inch would give rise to limp-

ing when the fracture occurs in the shorter limb under similar conditions. Oblique fractures with overriding and an angular displacement give even worse results in the shorter limb. A bone graft centrally placed is the best method which has been employed to bridge defects and lengthen the long bones. Much of the new bone that fills in and reinforces in this method of repair must go through the intermediate stage of cartilage formation, which is a rather long-drawn-out process of bone repair. This method requires absolute fixation of the fragments, as even slight motion would tend to cause absorption and prevent union. While this

upper fragment of 15 degrees; there was also some rotary displacement. Figure 1 shows the deformity with the fragments overriding about an inch.



I made a linear incision over the outer side of the thigh and carried it down to the bone at the point of fracture, and freed the bone from the soft tissues. The saw shown in figure 2 was used to



Fig. 4.



Fig. 2.

method covers a wide range of cases, the method which I am about to describe has proven very satisfactory in selected cases of angular deformity and shortening of long bones as a result of fracture. The following case illustrates this operation.

E. B., seven years old, family history negative. She broke her left leg at five and a half years of age; the bone united readily. While playing in the street three months ago, she fell and broke her right thigh; this was put in a splint and union took place with deformity. When I saw her three months after the injury, she walked very lame. The right leg measured one and a half inches shorter than the left and showed an angular deformity. The lower fragment turned inward, making an angle with the

make the section of the bone. It is so constructed that the blade can be set at any angle with the plane of the frame. In this case it was set at $67\frac{1}{2}$ degrees. I made the bone incision, shown in figure 3, *a.c.d.b.c.f.g.* The fragments *a.b.c* and *c.d.e.f.* were removed. The bone was re-set and its fragments fastened together with the screw "s" cut off close to the bone (figure 3). This also shows spaces *a.c.c'*, *b.* and *g'e'*, *e.g.* filled with new bone. All the instruments used in this operation are shown in figure 2. The wound was closed and the leg was placed in a long plaster cast which was removed at the end of five weeks. The skin stitches were then removed; and union was firm. Both extremities measured the same and there was no appreciable deformity. Figure 4 shows the final result. The screw has caused no trouble, so it has been left in place. The child now walks without a limp.

DIEULAFOY'S ULCER.

Profuse gastric hemorrhage in the young with previous symptoms of ulcer is not uncommonly due to mucus erosions or hemorrhagic gastritis. The cause and pathology of these so-called Dieulafoy's ulcers are not clearly understood, but clinical experience shows that it is an acute condition, not ordinarily fatal, tending to clear up spontaneously and often followed by no sequelae of any kind. Gastroenterostomy has been advocated for this condition, but the evidence, in my opinion, does not warrant its use in every case. On the other hand, massive hemorrhage from the erosion of a vessel in the base of a chronic ulcer is a very dangerous condition and urgently calls for intervention. At the same time it is not wise to operate upon the patient in an exsanguinated state. The first hemorrhage rarely kills and with proper treatment some reaction may be expected. On the other hand, reaction with the rise of blood pressure is apt to excite a fresh hemorrhage which is more likely to be fatal than the first. It becomes a question of nice surgical judgment, therefore, to decide when to operate.—JOHN B. DEEVER in the *Long Island Medical Journal*.

URINARY TUBERCULOSIS.

Remember that most cases appeal to the general practitioner and, if he wastes their time and his effort in useless bladder washing, he is surely allowing the best time for cure to slip by. Where frequency of urination is complained of and pus is present in the urine, do not give urotropin and do not wash out the bladder unless you are sure the condition is not tuberculous.—G. S. WHITESIDE in *Northwest Medicine*.

THE SURGERY OF THE POSTERIOR TIP OF THE INFERIOR TURBINATE; THE RELATION OF THE POSTERIOR TIP TO CATARRHAL DEAFNESS AND TINNITUS.

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It is well appreciated that anything that interferes with the proper action of the tubal muscles, or anything that causes a chronic irritation to the Eustachian tubes, or anything that causes obstruction to the passage of air into the Eustachian tube, will have a tendency to bring about a progressive deafness and the accompanying distressing condition—tinnitus.

Among the various factors that cause a progressive diminution of hearing on account of their action on the Eustachian tube (mainly by causing a stenosis) may be mentioned a chronic hypertrophy of the mucous membranes associated with chronic intranasal conditions, i.e., sinus disease, polypi, chronic hypertrophic rhinitis, deviated septum, etc.; in the throat and nasopharynx, hypertrophied and diseased tonsils, adenoids, and adhesions in the fossa or Rosenmüller.

I believe that those dealing with the treatment of deafness seldom appreciate the importance of the rôle that the posterior tip of the inferior turbinate plays in the causation of this condition. It is on account of that important rôle that I desire to explain briefly a simple operative procedure for the removal of this posterior tip.

One must first understand thoroughly the anatomy and pathology of the inferior turbinate. Anatomically, the inferior turbinate is situated along the floor of the nose and is attached anteriorly to the superior maxillary bone, posteriorly to the inferior turbinated crest of the palate bone, and its middle portion articulates with the lacrymal bone and the superior maxillary. It extends from just within the free margin of the nostril almost to the nasopharynx, and is covered with a thick heavy mucous membrane of ciliated epithelium. The apparent size of the bone varies from time to time, due mainly to the action upon its mucous membranes of various irritants. This mucosa frequently becomes hypertrophied to such an extent as to cause interference with breathing, and this is particularly so of its anterior and posterior tips. The posterior tip is liable to undergo various forms of degeneration, mainly forming itself into a mulberry mass, which extends into the nasopharynx

and often encroaches upon the orifice of the Eustachian tube.

One can well see that a mass of this character, in this location, very often becomes edematous and, if sufficiently enlarged and irritated, that it can cause trouble to the various surrounding tissues. Not only does it act as an obstruction to the Eustachian tube, but it is very liable to cause an excess of secretion of thick mucus, which in itself may lodge in the tubal orifice and cause inflammation or obstruction.

According to the ordinary methods, unless one is very skilled, it is extremely difficult to remove the posterior tip. Many operators make it a point not to use adrenalin in these cases, for the edematous mass is liable to shrink to such an extent that it is difficult to remove. However, if one uses the technic which I am about to outline I am sure that he will not meet with many difficulties.

The nostril is first sprayed with a dilute solution of cocain and adrenalin. Two pledgets of cotton are soaked in this solution. One is placed underneath the turbinate against its attachment to the maxillary wall, and pushed back with an applicator. The other is placed over the entire mucous membrane of the turbinate. These are left in place for ten to fifteen minutes, and when they are removed the mucous membrane is sufficiently shrunk so that one can often see into the nasopharynx. By doing this, of course, the posterior tip is also much smaller. It is then our object to increase the size of this to such an extent that it can be well seen. A fine needle three inches long is attached to an ordinary hypodermatic syringe into which is placed equal parts of one-quarter of one per cent. cocain and adrenalin (1-1000). The injection of this solution is begun at the posterior two-thirds of the turbinate and is extended well back into the posterior tip. On account of the looseness of the tissue in this region one can balloon this area out sufficiently so that it can be readily seen.

An angular scissors is introduced, closed, beneath the turbinate and between it and the maxillary wall as far back as possible. By grasping the handle of the scissors firmly in one hand and placing the other hand on the top of the patient's head the closed blades are rotated inward until the entire turbinate is fractured from its attachments, when it will stand out at right angles. The closed scissors is now withdrawn and an incision is made into the turbinate at its posterior third deep enough to engage the tip of a wire snare. The snare is then introduced through the nostril to the nasopharynx,

and the wire rotated outward until it is seen to pass over the posterior tip. It is then drawn slightly forward, the shank of the snare being pressed firmly into the incision formerly made. By closing the wire the posterior tip is firmly grasped and snared off. I have found Wright's pistol snare the best for this procedure. The rest of the turbinate is then placed in its former position, and a small strip of bismuth subnitrate gauze placed in the nostril, firmly against the cut surface.

Post-operative treatment is very simple. The patient is told to rest for the remainder of the day, iced cloths are put around the neck to stop the hemorrhage, and the following morning the gauze in the nose is saturated with liquid albolene until it comes out very readily. The patient is then given a spray of adrenalin and Dobell's solution.

I have seen the pathological part of a posterior tip present in many cases of beginning deafness, and have noted considerable improvement in this condition when the above outlined operative procedure was followed.

11 WEST 81ST STREET.

TREATMENT OF ACUTE PNEUMOCOCCUS PERITONITIS.

When a patient is seen suffering from acute diffuse pneumococcus peritonitis, every effort should be made to support the patient, and with proctolysis or continuous hypodermoclysis, Fowler's position, camphor stimulation, and the withholding of all fluids and solids by mouth, an attempt to tide him over until the acute stage passes. The localized abscess, whether subdiaphragmatic, pelvic, lumbar, or between loops of intestine and the abdominal wall, may be opened with comparative safety and effectively drained.—L. MILLER KAHN in the *New York Medical Journal*.

GASTRIC ULCER.

A plan which I have recently followed successfully appeals to me as sufficiently rational. After opening the abdomen and locating the ulcer, the stomach should be opened and the base of the ulcer inspected. If the vessel is seen it may be ligated directly by transfixion. If, as is more commonly the case, no erosion or artery is seen, a stitch of catgut should be whipped around the base as well as the edge of the ulcer with the object of occluding the vessels supplying it. The stomach may then be closed and a gastroenterostomy quickly performed. I liken this procedure to hysterotomy, of which I am a strong advocate.—JOHN B. DEEVER in the *Long Island Medical Journal*.

THE SURGEON'S REPUTATION.*

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One who worries about his reputation knows in his heart that he ought to worry about it. The reasons are apparent to him. Furthermore he cannot help himself in the matter. Explanation serves only to complicate matters. The situation is hopeless and disheartening, nothing being left for him excepting to continue worrying. On the other hand, one who worries about his character is in the midst of opportunities for helping himself daily, and the worry is transitory in duration.

There is a tendency always to be more jealous of reputation than of character. In the professions we are inclined to be jealous of each other and properly so, because of our high ideals, but our worry should be less about personal reputation than about personal character.

Recognition of a young practitioner comes first from colleagues and fellow workers. Those who are very close to a man are the ones best able to understand the significance and degree of his accomplishments. Public speaking and publication of ideas come next in order for giving a wider recognition, if one can make himself interesting without undue self-advertisement. A reputation that endures is based upon the foundation of appreciation on the part of colleagues, rather than upon ideas gained by a professional lay clientele. The superstructure of reputation never gets far above a base which can support it.

Practice is not to come from some indefinite imaginary point as many young men in the profession imagine. It is to come chiefly through old acquaintances, and in proportion as one has merited the respect of such close acquaintances. The three greatest social powers in the world are love, oratory, and propinquity, and of these the greatest is propinquity. The young physician who places himself near to objects of his ambition is apt to find himself drawn along without his conscious knowledge, toward the goal which he seeks.

When one first takes up the responsibilities of caring for human life and happiness it is apt to make him sleepless at night. He cannot do the best work after missing a good night's rest. Realizing that fact, I stopped being sleepless in 1883, when serving on the Bellevue staff as house surgeon. This is easily accomplished by one in normal

health as a matter of the will, if he determines to stop all thinking upon retiring at night. It is best to take a lesson from the French doll. When one assumes a recumbent position his eyes naturally fall shut automatically like those of a French doll, and he may then remain like the doll until the next morning.

Members of the visiting staff at Bellevue were theoretically responsible for all of the people under my care, but practically my own responsibility was so great, with daily opportunity for mistakes in judgment that might cause death and suffering, that I found it difficult to rest. A little experience showed that the patients who were the cause of this worry had slept better than I during the night. An effort of the will was then brought to bear upon cessation of all thought at a certain hour, and this was accomplished without real difficulty.

We used to hear in former times about surgeons who "walked the floor late into the night" before doing some important operation. This kind of temperament is absolutely "impossible" for a surgeon of the present day. The patient should have been the one to walk the floor while the doctor was getting a good night's rest. The surgeon must be securely calm in his knowledge of what he is about to do,—or else turn the patient over to someone who is calm. Surgical work is almost certain to be done badly by anyone who carries a perturbed spirit into the operating room. Deaths are more often due to little errors in technic than to application of wrong principles.

Fame brings many complicated problems that require time for their adjustment. I would rather enjoy my pliant trout rod and the song of the hermit thrush, the fragrance of moist cedars and the beauty of a white violet in the soft green moss, than any combination of joys that fame can bring. I would not care to be great, because that incidentally takes up much time. Greatness is desirable in Nature's plan. No one admires great or famous men more than I do—if they are honest men—but personally it seems pleasanter to allow other people to have these things, which take up time that is precious for my own studies. I would rather be called plain Bob Morris by my friends than to be called any sort of a genius.

As one continues to maintain a position in the profession, the tendency is for more and more positions of trust to be placed upon him, and he must be constantly on guard against accepting too many. The desire for leadership is a matter of temperament, and brings responsibilities requiring a certain type of mind. When circumstances have placed me

* Advance pages from a book entitled "Wayside Notes" to be published by Doubleday Page & Company, New York.

in positions that led step by step toward leadership, I have made an effort to escape. This plan would naturally not be followed by men of a different temperament. If a young man has qualifications and taste for leadership, duty will indicate that he follow that bent and play a most necessary part in affairs.

The time comes when one has added so many responsibilities to his list that it is practically impossible for him to take on one more, and yet it is difficult to avoid shouldering more than he can really manage well. I find the only way for obtaining mental relief is to emulate the guinea-hen, and she is now my symbol. A guinea hen will find a choice corner in the brush lot and soon has forty eggs in her nest. She cannot hatch all of them but she sits in the middle of the nest and hatches out all of the eggs that she can, and lets the rest go. The lesson taught by the guinea hen came to me as a great comfort.

CESSATION OF EPILEPTIC SEIZURES AFTER REMOVAL OF PREPUCE AND FIBROMA IMBEDDED IN URETHRA: CASE REPORT.

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Male, aged 52, weight 180 lbs. Had been under treatment for epilepsy for fifteen years. His seizures were from one to six a month, accompanied by involuntary micturition.



His sight was good; he was constipated and had occasional headaches. No history of injury.

The foreskin, covering the meatus, was adherent on the right side behind the corona glandis. In the fossa navicularis the urethra was narrowed to the size of a filiform bougie by a tumor growing into it from the prepuce.

The foreskin was removed with the attached growth, which was found to be a fibroma (see photograph). Since this operation, two years ago, there has been no recurrence of the epileptic attacks.

A MODIFICATION OF PODALIC VERSION.

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The modification of podalic version here described is not applicable to all cases requiring version. It has been tried in about a dozen cases and they have partially proved the theory, but the method must stand the test of general usage. The idea was induced by the loss of time, frequent prolapse of the umbilical cord and consequent deaths to babies during version in a certain class of cases.

The cases where version is still practical but where there is enough of disproportion to necessitate considerable traction on the child's body for extraction are the ones referred to here. The ordinary procedure under such circumstances is to extract one leg and when it is found that much traction is necessary the accoucheur's hand is again inserted and the other leg is brought down. In this way the umbilical cord is often brought down and much time is wasted. The hand is introduced into the uterus when the lower segment is already under too great tension due to the head of the child being doubled against the body and the baby's other thigh and leg increasing the bulk. The head does not slip up well because of this and both external and internal manipulations are dangerous for the same reasons as pressure and friction on a tense perineum.

To partially correct the faults of the above method the following is submitted: Instead of bringing down one leg, the operator takes time to carefully straighten out both and to separate the cord from between the thighs. He then grasps both ankles with a finger between them, rotates them to the side or the anterior oblique diameter and draws carefully down in the pelvic direction. In this way much time is saved and the tension of the lower uterine segment is much lessened, due to the absence of the second thigh. For the same reason the head slips up more easily and no further internal or external manipulations are necessary. The cord does not come down because it is not looped around the child's thighs or legs. The extra time is taken during a comparatively safe stage. The objection that this method does not dilate the cervix as well as the other must receive consideration in the preliminary stretching of the birth canal.

Never apply an elastic ligature about the arm without first interposing a towel. This may obviate subsequent paralysis.

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WALTER M. BRICKNER, M.D., Editor

NEW YORK, JANUARY, 1915.

THE UNSETTLED PROBLEM OF PYLORIC OCCLUSION.

Experiences with gastro-enterostomy for pyloric stenosis due to ulcer constitute very apt illustrations of the remarkable tendency in the human body towards reformation of a physiological lumen. It has been found that, when food has been deflected through the new gastroenteric stomach for some time, the pylorus becomes patent again in not a few cases. The unused stoma then closes, in part or entirely, irritation of the ulcer at the pylorus results in a second stenosis, and the patient's symptoms recur. This rather schematic outline of the mechanics of some of the reported cases suffices to indicate the reason for, and the importance of, the many efforts made to permanently occlude the pylorus. Of course the ideal method is to resect the pylorus with the ulcer-bearing area. Even when feasible, however, this procedure is not always desirable because it adds considerably to the risk of the operation. The same may be stated for the operation consisting in division of the pylorus and suture and inversion of the cut lumina.

The first efforts towards simple occlusion of the pylorus consisted in the ligation with stout silk thread. It was soon found that the silk worked its way into the interior of the stomach and that the pylorus became patent in many instances. Although more successful, the method consisting in crushing and ligating the pylorus was also found unsatisfactory. This is not the place to review all the

methods that have been employed to occlude the pylorus permanently. It is sufficient to state that none of them has had the full measure of success. Some recent encouraging efforts should be mentioned. Basing his work on uniformly satisfactory experimental results, Wilms performed pyloric occlusion, in several cases, with strips of fascia lata and reported completely successful pyloric closure. The operations have been performed at too recent a time to decide finally upon the method; unfortunately, however, an unsatisfactory result has already been reported by another observer. In a recent contribution,* Strauss describes ideal results, in a series of experiments observed during a considerable period of time, by shelling out the pyloric mucosa (through an incision of the muscularis) and ligating it with a strip of fascia. It is very doubtful, however, if this operation will have any great practical possibilities, for it presupposes normal pyloric tissues and a quite bloodless layer of cleavage between mucosa and muscularis.

It is evident, however, that the very important problem of securing an adequate and permanent occlusion of the pylorus is still far from solved. Perhaps its solution will be found by some simple modification of already proposed operations.—H. N.

THE PHYSICIAN AND ACUTE OSTEOMYELITIS.

The surgeon has visited upon the head of the physician much blame for his tardiness and temporizing in cases of appendicitis. The physician has merited all of the criticism that has been heaped upon him, and even then he was, perhaps, let off too lightly.

The same may be said of the physician's relation to gastric ulcer, duodenal ulcer, perforating typhoid ulcer, apoplexy, empyema, metrorrhagia, and "rheumatism." Indeed, as we look over the catalogue of human ills, it is difficult to find one in the treatment of which the surgeon might not render aid.

In some of these diseases, conditions develop which surgery would cure, but which without the surgeon often go on to healing. In others the treatment which the surgeon applies results disastrously. Still, in all of these conditions if modern surgery were applied the chances of recovery are better than without it.

Acute osteomyelitis belongs in a class by itself. It is wholly surgical. The physician has no business with it for a single minute. This can scarcely be said of any other disease. Even cancer is not

*Journ. of the A. M. A.

wholly surgical; the surgeon often can do nothing more than the physician. But with acute osteomyelitis the surgeon can always do something.

There is but one treatment for this disease. As soon as the infection occurs and begins to make pressure within the bone, the damage begins. To relieve the pressure in the medullary cavity and secure drainage through its bony sheath is imperative. Unless this is done promptly, the infection and inflammation, confined under the pressure of non-yielding bone, cause necrosis of more medulla, death of the bone, and absorption into the general system of the products of the infection. Most important among the latter are the infective organisms themselves. Metastatic foci develop, and to the local destruction is added a virulent general infection which threatens the bones, joints, the valves of the heart, and every other structure in the body.

These are the cases which come to the surgeon from the physician after having been treated for "rheumatism" or what-not. Necrotic bone, metastatic abscess, arthritis, and endocarditis have all developed often before the surgeon sees the case. If modern surgery is applied as soon as the disease is recognizable, a simple trephine opening into the bone suffices to cure the disease. Without this the case goes on; and loss of bone, crippling of limbs, invalidism or death may be expected.

The diagnosis of most surgical conditions may fail even in experienced hands. Many surgical conditions recover without surgery. Some are aggravated by surgery. But acute osteomyelitis is most easy of diagnosis, even in its earliest stages. It invariably does badly unless treated surgically. Its treatment is so simple that surgery at its worst cannot do as much harm as the disease.—J. P. W.

THE MCBURNEY INCISION.

The still popular gridiron incision is quite satisfactory for a simple appendicectomy; but one can never be sure that a presumably simple appendicectomy will not eventuate as a much more extensive operation requiring liberal exposure. Nor does the McBurney incision lend itself well to exploration of the gall-bladder, pylorus, etc., which cases of presumed chronic appendicitis so often require. To be sure almost any intraabdominal operation can be performed through any incision if it is large enough, and, of course, the McBurney incision can be enlarged in various ways. Those who use it as a routine, however, must often encounter otherwise avoidable technical difficulties and must often overlook conditions that would be obvious through the right rectus incision.—W. M. B.

DAMAGED GOODS.

Brieux' play, "Damaged Goods" (*Les Avaries*), has been splendidly instructive to the public of the widespread dissemination of syphilis and of its subtle dangers to the innocent. The medical data it presents are for the most part accurate and well chosen. There is one statement, however, in the first act, that is wholly incorrect. To his recently infected patient, insistent upon marrying within a few months, the doctor says that the children of syphilitics are apt to have hare-lip, club-feet and congenital hip disease. (We know of no "congenital hip disease." Probably congenital dislocation of the hip is meant.)

Such fetal malformations as hare-lip, club-feet, and dislocation of the hip are not stigmata of syphilis and have no relation to the disease. Mothers of children bearing these abnormalities, who read or hear of this unfortunate passage in the play, will probably suspect that their husbands and their offsprings are syphilitic. In the interest of the peace of mind of such mothers, even more than for the mere sake of accuracy, this passage should be corrected.—W. M. B.

Surgical Suggestions

Hard nodules in the prostate due to calculi may be mistaken for carcinoma. The routine radiography of prostatic cases will obviate this error.

After perineorrhaphy it is in most, if not in all, cases unnecessary to bandage the thighs together, as is so often done.

Inversion of the appendix stump into the bowel within a pursestring suture is unnecessary. Quite as safe and at least as free from the chances of forming local adhesions, is the quicker procedure of merely tightly ligating the base of the appendix with catgut, and cauterizing the surface and lumen of the stump with pure phenol.

The midline (linea alba) incision into the abdomen is always inadvisable (especially in the hypogastrium of multiparous women, whose tissues here are stretched and thinned), since, even when no drain is used, a hernia often results. Except when a hemorrhage or other emergency demands great haste the opening should be made to one side of the linea alba, *i.e.*, through the rectus sheath, retracting or splitting the muscle.

Surgical Sociology

Ira S. Wile, M. D., Department Editor.

MEDICAL FACTORY INSPECTORS.

The protection of workers in industrial establishments requires a high degree of enlightenment on the part of employers and employees. The mere promulgation of laws fails to secure the results intended. Industrial hygiene involves an interpretation of sanitation, hygiene, and medicine in the light of personal health, home environment, and industrial conditions. The type of factory inspector which has existed is hardly sufficient to guarantee thoroughgoing medical inspection of industrial establishments. While it may not appeal at the present time to the medical profession as a type of employment offering possibilities, there is little question that in the future medical factory inspectors will be needed.

At the present time, England and Belgium maintain separate medical divisions in their factory inspection departments (Bull. 42 U. S. Dept. of Labor). Their services are required for the purpose of making investigations of occupational diseases, supervising medical work in dangerous trades, and doing specialized work in industrial hygiene. In addition, there is a supplementary group of physicians whose function it is to examine minors and children, investigate industrial accidents, and control dangerous trades.

While medical factory inspection is virtually an undeveloped department of activity in most of the foreign countries, factory inspection itself is regarded as a special vocation and of high professional standard. The preparation for this work must necessarily be rigid and thorough for the preparation for such a life profession involves education and responsibility equal to that of law, medicine, or engineering.

In our country, owing probably to its youth and freedom, state service is not regarded as as highly desirable as in the older and more socially developed European countries. To serve the state is one of the ambitions of foreign youths. In this country, it is for the most part regarded in the nature of a supplementary resource or a transitory employment until some better position presents itself.

The assumption of medical work in various degrees and kind by municipalities, the states, and the federal government is all too frequently regarded by physicians as an encroachment upon their prerogatives and finances. It has not yet been recognized that civic medicine is opening the doors to unusual opportunities for medical men; and our medical institutions are failing to call attention to the vast number of collateral occupations that are now open to physicians who are willing to serve in employments requiring a medical education and that are as legitimately the practice of medicine as the daily attendance upon a small group of individuals regarded as private patients.

The activity of medicine and surgery is assuming a public aspect of wider significance than ever before. The entrance of medical men into public careers is to be hailed with delight. It means more efficient service, more educated public servants, and more scientific attainment in the field of civic hygiene which is so essential for the promotion of public welfare.

THE FEDERAL WORKMEN'S COMPENSATION ACT.

The enactment of compensation acts to justly lessen the burdens of injured workingmen has already been recognized in twenty-four states. The first act in the United States was the Federal Law of 1908. It has now completed the first five years of its operations and the report of its services is detailed in Bulletin 155 of the United States Department of Labor.

About 95,000 persons are covered by the provisions of this act, and there have been 42,290 accidents reported during the five years, of which 1,006 were reported as fatal. It is noteworthy that the mortality during each of these five years has been lower than in the preceding years, which is clearly indicative of the fact that the mere fact of compensation for injuries not due to negligence or misconduct tends to increase the care of workmen rather than to make them more careless.

Over one million eight hundred thousand dollars have been paid out as compensation. While all accidents are reported, provided that they cause disability for longer than one day, compensation is given only for accidents causing a disability in excess of fifteen days. Negligence or misconduct of the injured workmen prevented the compensation of only 109 injured workmen in five years.

The basis of compensation is the wages of the injured workmen, the amount awarded being the same as the rate of such wages during the period of disability not exceeding one year. In fatal cases, the amount of payment is equal to one year's wages of the deceased workman. Nearly one-half of the accidents compensated occurred to men in the employ of the Isthmian Canal Commission with its 25,000 largely unskilled employees working under conditions of unusual hazard.

The full worth of the Federal Law cannot be readily determined by reason of the fact that compensation for non-fatal accidents terminates as soon as the injured person has recovered sufficiently to permit him to resume work. Therefore, few data are available with reference to the results of accidents because of permanent partial disability. Similarly, there is little information as to the effects of accidents causing a disability for a period beyond one year. It is unfortunate that the Federal Law does not treat the problem of permanent partial disability on a different basis from disability from which complete recovery is possible. It is obvious that under such circumstances inadequate compensation must frequently result. For example, in the case of the loss of a right arm, the workman might receive less than \$50, and in three

cases wherein the loss of both legs resulted, the average compensation was only \$377.40.

Regardless of its shortcomings, however, the Federal Compensation Law has been of immense benefit to a large number of injured employees and their families. Furthermore, this law served properly as a stimulating, practical act for the reasonable consideration of the value of workmen's compensation acts to the states of the Union wherein such legislation had not been formulated. Future amendments will undoubtedly serve to correct the defects already noted and will tend to provide for an extension of the provisions of the act to all federal employees of whom three-fourths are not included under the provisions of the law.

In extensive social legislation along lines of compensation, this government is far behind the standards existent in foreign countries. Furthermore, state legislation has advanced so that at present many of the states of the Union have wider and more just laws relating to workmen's compensation than provided for in the Federal bill. It would seem to be a function of national government to point out the way for the various states to make adequate provision for the protection of employees. The recognition of the obligations of society to lessen the burdens from accidents might well be pointed out by the national government through adequate attention on its part to its numerous civilian workers. In the organization of our government with the sovereignty of states recognized as it is, it becomes difficult to establish uniform legislation. Probably, there is an advantage in this fact, inasmuch as each state presents its own problems and its legislation grows out of the educational enlightenment of its population. Wherefore, there are numerous social experiments constantly being developed, the outcome of which may lead to the formulation of the type of enactment which will afford the greatest justice to, and protection of, the industrial workers throughout the country.

Book Reviews

Surgical Diseases and Injuries of the Genito-Urinary Organs. By J. W. THOMPSON WALKER, M.B., C.M. Ed., F.R.C.S. Eng., Hunterian Professor of Surgery and Pathology, Royal College of Surgeons of England (1907), etc. Octavo; 879 pages; 45 plates (24 in color) and 279 text illustrations. New York; FUNK & WAGNALLS Co., 1914

Thompson Walker's eminence as a urologic surgeon is sufficient to attract, and the excellence of this work is sufficient to hold, deep interest in his new book on genito-urinary affections.

With certain exceptions (vide infra) it covers the entire field of the diseases, injuries and malformations of the male and female urinary tract and of the male genital organs. It is not, however, encyclopedic in any sense, and is intended as a text-book rather than as a treatise in its broader meaning. The author therefore makes no pretence to include all the literature, but bases his work chiefly on selected recent publications and on his personal experiences. Indeed, he makes his own observations serve largely as the substance of his text, which is, after all, the desideratum in all practical medical text-books of authoritative origin. Also quite in keeping with his text-book plan, Walker has adopted the anatomical

rather than the pathological classification of diseases, and one must agree with him that this is better for the purpose intended.

One of the most striking and most helpful features of the book is its wealth of excellent original illustrations, including numerous beautiful colored plates. These assist the text in presenting what the author has carefully aimed to supply, clear pictures of the "living pathology."

In a review of the first edition of so important a book it is fair to our readers, and helpful to the author, to point out some of its shortcomings rather than to deal only in general description.

Appended to each subject is a selected bibliography. Since this list is in each case admittedly incomplete the references to the author's own publications appear unduly numerous. We note, too, that not sufficient care has been taken in the spelling of proper names; thus we find *Cautwell* for *Cantwell*, *McMurty* for *McMurtry* and *Moschkowitz* for *Moschcowitz*.

In the chapter on bladder tumors there is not the slightest reference to Beer's treatment of vesical papilloma with the "high-frequency" spark. This method, now widely practiced, has been before the profession for about five years. We are forced to conclude that Thompson Walker has no experience with, perhaps no knowledge of, one of the most important of recent contributions to urologic surgery.

Neither in the section of undescended testis, nor in the appended literature, appears the name of Bevan, although the operation as described includes the principle feature of the procedure that usually bears his name. The fixation operation described by the late Keetley of London and, a little subsequently, by Torek of New York, is not referred to; but perhaps the author, like many other surgeons, does not approve of it.

The section of cystoscopy is too brief for a work intended for students and novitiates. We cannot quarrel with the author for preferring his own irrigating and catheterizing cystoscope, but we believe that he should have described and compared a few of the other commonly used instruments.

The results of castration for testicular neoplasms are given from the statistics of Chevassu and of Russell Howard, without reference to the morphology of the tumors. This is confusing and unsatisfactory. More detailed data are available.

Acute and chronic gonorrhea are dealt with in considerable detail; so is syphilis of the bladder, of the kidney and of the testis; so, too, are balanitis and herpes preputialis. Yet chancre and chancroid are not described. This is an inconsistency, a strange incompleteness.

The clinical value of the work would have been enhanced, we believe, by the inclusion of separate chapters dealing with the routine differential diagnosis of renal and bladder affections; special preparations for major urologic operations; operative methods in general; the after-care and complications of major operations.

These, then, are some of the defects in a generally excellent, very interesting, altogether practical and, pictorially and typographically, exceedingly attractive book.

A System of Operative Surgery. By various authors. Edited by F. F. BURGHARD, M.S. (Lond.), F.R.C.S. (Eng.), Teacher of Operative Surgery in King's College, London, etc. *New Edition.* In five large octavo volumes; illustrated. London: Oxford Medical Publications. HENRY FROWDE and HODDER AND STOUGHTON, 1914.

As compared with the four-volume first edition of 1909 this edition does not show a general revision. A change has been made in some of the authors and corresponding sections have been re-written. In Volume I, *The Principles and Technique of Aseptic Surgery* is now contributed by PERCY SARGENT; in Volume II, *Operations upon the Tongue* is now written by H. J. WARING, *Operations upon the Tonsil* by GEORGE E. WAUGH, *Operations upon Malignant Disease of the Pharynx* by WILFRED TROTTER. Volume III appears the same in both editions. Volume IV is devoted to the surgery of the eye, ear, nose, larynx and trachea. It shows minor changes made to include

recent advances. Gynecologic operations, which formerly also appeared in Volume IV, now constitutes Volume V, and this section has, indeed, been largely recast. Formerly written by BLAND-SUTTON and JOHN PHILLIPS, they now share the work with ANDREWS, LEEDHAM-GREEN, BONNEY, JELLETT, BELL, MAXWELL and LEA.

Abdominal Operations. By SIR BERKELEY MOYNIHAN, M.S. (London), F.R.C.S., Leeds, England. *Third Edition.* In two large octavo volumes of about 500 pages each; 371 illustrations. Philadelphia and London: W. B. SAUNDERS CO., 1914.

The second edition of this standard work, in one volume, was published eight years ago. In the preparation of this two-volume edition the entire text has been thoroughly revised and modernized, and considerably enlarged. It shows a careful study of all the recent literature and the inclusion of such of it as is important. Thus the index of names lists about 900 authors referred to.

Although entitled "Abdominal Operations," the work concerns itself, as before, only with operations on the stomach and intestines, the peritoneum, the pancreas, the spleen, the liver and biliary tract, and the subphrenic space. Operations on the urinary tract, the pelvic organs, the abdominal wall (other than for penetrating wounds), and herniae are not included. Nor is resection of the rectum described. In short, Moynihan devotes his work to those operations or types of operation that he practices.

The preliminary chapters, dealing with operative methods, preparation, after-treatment, etc., have been revised with the others, and include a brief description of Crile's anoci-association technique, which Moynihan has adopted.

Précis de Chirurgie de Guerre. By EDMOND DELORME, Medical Inspector General of the French Army. Duodecimo; 218 pages. Paris: MASSON ET C^{IE}, 1914. Price, 4 fr. 50.

Of timely interest is this compact yet comprehensive volume on war surgery. The offensive and defensive types of war implements are all dealt with and the casualties produced are tabulated according to the region involved; the prognosis, course and treatment of the injury are then discussed briefly and clearly. Delorme dwells at considerable length upon the bone lesions. These he classifies according to the type and severity of the injury, presenting simple and adequate illustrations to explain the mechanism of fractures. He has employed with satisfaction simple and apparently satisfactory metallic splints for which he claims a particular usefulness in fractures of long bones near or involving joints. The condensed chapters on wounds of the thorax, the abdomen, the spine, the upper and lower extremities shed no new light, but their subject matter is well arranged and written with authority. Delorme has comparatively little to say about amputations, but he lays stress on the importance of combating hemorrhages, primary and secondary.

The volume is agreeably free from overburdening statistics. The appended charts for statistical and case study are well planned.

The Tonsils, Faucial, Lingual and Pharyngeal. With some account of the posterior and lateral Pharyngeal Nodules. By HARRY A. BARNES, M.D., Instructor in Laryngology, Harvard Medical School; Surgeon in the Department for Diseases of the Nose and Throat, Boston Dispensary; Assistant Laryngologist, Massachusetts General Hospital; Member New England Laryngological and Otological Society; Member American Laryngological, Rhinological and Otological Society. Octavo; 168 pages; 39 illustrations. St. Louis: C. V. MOSBY CO., 1914. Price, \$3.00, net.

Barnes' monograph on the tonsils takes up in a very simple and complete manner the modern views concerning tonsils and the surrounding tissues of Waldeyer's ring. We agree with the majority of his conclusions, although in a few instances we might take issue with him. The most important chapters are those which deal with the development of the tonsil and its anatomy and histology.

The volume is profusely illustrated with excellent cuts, and forms a valuable addition to the various new works on the nose and throat.

Infection and Resistance. An Exposition of the Biological Phenomena Underlying the Occurrence of Infection and the Recovery of the Animal Body from Infectious Disease. By HANS ZINNSEN, M.D., Professor of Bacteriology at the College of Physicians and Surgeons, Columbia University, New York, formerly Professor of Bacteriology and Immunity, Leland Stanford University, California. With a chapter on Colloids and Colloidal Reactions, by Prof. STEWART W. YOUNG, Professor of Chemistry, Stanford University. Octavo; 546 pages. New York: THE MACMILLAN CO., 1914.

Amidst the wealth of new works upon infection and immunity that have been published in recent years, this work stands conspicuous. It is the best that we have seen. It is a combination of lucidity and comprehensiveness such as we meet but rarely in any medical work. By writing each chapter as a separate unit, Zinnser affords a complete and indelible picture of those under discussion. At the same time, the critique of the vast literature which the author commands so easily is so admirable that the reader is never left in doubt as to what is fact and what is still debatable. The chapter on colloids is short, but sufficient to enable the reader to note the close relations between the reactions of immunity and of colloids.

Pathogenic Microorganisms. A Practical Manual for Students, Physicians and Health Officers. By WILLIAM HALLOCK PARK, M.D., Professor of Bacteriology and Hygiene, University and Bellevue Hospital Medical College, and Director of the Bureau of Laboratories of the Department of Health, New York City, and ANNA W. WILLIAMS, M.D., Assistant Director of the Bureau of Laboratories, N. Y. Health Department; Consulting Pathologist, N. Y. Infirmary for Women and Children. *Fifth Edition.* Octavo; 684 pages; 210 engravings and 9 plates. New York and Philadelphia: LEA AND FEBIGER, 1914.

This much-used manual is an outgrowth of the laboratories of the N. Y. City Department of Health and was published first under the title Bacteriology in Medicine and Surgery.

Part I, Principles of Microbiology, deals with the various microorganisms in general and with laboratory methods. Part II considers the individual pathogenic organisms in detail. Part III is devoted to Applied Microbiology, viz. the bacteriology of milk, water, air, the soil; disinfection; water contamination and putrefaction; milk sterilization; the disposal of sewage; and bacteria in industries.

The Germ-Cell Cycle in Animals. By ROBERT W. HEGNER, Ph.D., Assistant Professor of Zoology in the University of Michigan. New York: THE MACMILLAN CO., 1914. Price \$1.75.

To those interested in the problems of heredity, genetics, of animal breeding and hybridization the morphological studies of the changes in the germ cells as set forth in this book, cannot fail to prove of the deepest interest. The maturation of germ cells receives less attention than the segregation of the germ cells in the developing egg which from the author's viewpoint deserves greater emphasis. Not a small feature is the appended bibliography of more recent literature bearing on the subject treated to which the author has richly contributed.

Case Histories in Obstetrics. Groups of Cases Illustrating the Fundamental Problems which arise in Obstetrics. By ROBERT L. DE NORMANDIE, A.B., M.D., Assistant in Obstetrics, Harvard Medical School, etc. Octavo; 516 pages. Boston: W. M. LEONARD, 1914.

This book is written by one who has been accustomed to teach obstetrics at the bedside. The case reports embrace practically all the usual experiences of a well-

trained obstetrician and set forth in a very lucid manner the important and vital considerations in the management of normal and abnormal pregnancies, labors and the puerperal state. It is no book for the student, but it is a distinct aid and consultant for the beginner in the practice of obstetrics. For the reader who may have a large personal experience in obstetrics there is much in the pages of this book that may serve to check up observations, elucidate certain points or even stimulate clinical interest, for the author has succeeded in presenting so many living cases from his private and hospital work.

Selected Papers. Surgical and Scientific, from the writings of ROSWELL PARK, late Professor of Surgery in the University of Buffalo and Surgeon-in-Chief to the Buffalo General Hospital. With a memoir by CHARLES G. STOCKTON, M.D. Octavo; 381 pages. Buffalo: THE COURIER Co., 1914. Price, \$3.00, net.

This is a handsomely printed memorial to an eminent surgeon and gifted teacher, consisting of a selection from his many published articles, chiefly surgical, and a memoir written by his friend and university colleague, Stockton.

Progress in Surgery

A Résumé of Recent Literature.

Note on the Wounds Observed During Three Weeks' Fighting in Flanders. G. H. MAKINS, *Lancet*, November 21, 1914.

The wounds are in the main of very severe type; this appears to be dependent on the fact that they have nearly all been received at the short distance of about the 200 yards which separates the opposing trenches, and that many bullets ricochet and acquire irregularity of flight by striking the margin of the trenches. The type of entry and exit wounds is somewhat varied from those produced by the older Mauser and Lee-Metford bullets; there is certainly more irregularity in form and size. One especially striking form is that in which the central round wound has a slit passing from opposite sides, suggesting that the original opening has been enlarged with a knife for purposes of exploration; such wounds are seen mainly on prominent points of the body, such as the margin of the patella or over an outstanding tendon. The number of large stellate exit wounds is also great, the most typical of all being those on the dorsum of the hand. The difficulty of being convinced as to the production of large explosive wounds by rifle bullet, shrapnel bullet, or fragment of shell respectively is very great. The patients positively state many wounds to have been produced by rifle bullets, which offer no resemblance to any type wound.

The presumption that the occurrence of gangrenous cellulitis might become rare with the establishment of more rapid means of transport has not been substantiated.

It has also proved that this condition may develop as the result of a simple rifle bullet wound, and when this is the case the absence of the safety vent afforded by the larger shell wounds may render the extension of the infection a still more rapid process. With regard to the influence of delay in transport on the development of gangrenous cellulitis, this affects only the extent to which the process may have reached when the patient comes under treatment, and can hardly be assumed to favor its actual origination. Experience of the same disease in civil practice needs only to be recalled to emphasize the rapidity with which the infection gains ground and the unlikelihood that any local antiseptic treatment could effectually cut it short.

The influence of the mechanical factor in favoring the spread of the process is well illustrated by the fact that while it spreads readily from wounds involving the deep planes of the limbs, the condition is not observed to develop in wounds of the thoracic parietes, of the abdominal wall, the neck or the scalp. In the latter cases

the wounds afford sufficient vent to prevent the development of the tension which favors the extension of the process.

The advent is not heralded by serious general symptoms, neither the temperature nor pulse rate rises very high, and there is little pain. The most striking features in the later progress are sleeplessness, the development of extreme anemia, and a peculiar slackness in the tension of the pulse. The patients meanwhile make little complaint.

Locally the first signs are rapidly increasing edema; at first white, later large patches of bronzy redness of unequal depth of tint develop, while at the upper limit of the discolored area crepitation is palpable. The bubbles of gas are often sufficiently large to raise an elevation which suggests on inspection a small varix of a vein; this is often seen in the areolar tissue over Scarpa's triangle. The glands of the axilla or groin enlarge early, but they are hard, not very tender, and never reach a large size or suppurate.

After two or three days the portion of the limb distal to the wound becomes cold, pulseless, and gangrenous. The distal gangrene is of the arterial type. The limb in cases which survive long enough mummifies, and a very sharp line of demarcation develops. Some of these limbs are intensely black in color.

No satisfactory method of treatment has been discovered. Multiple incisions at the limit of advance of the process check it and bring it to a standstill, and some benefit has been claimed from the method of injecting hydrogen peroxide in the same region, although Makins has seen little to support the opinion. The adoption of this method, however, lands the surgeon in a serious difficulty, since in spite of the arrest of the gangrenous process the perished limb persists as a source of septicemia, hectic develops, anemia becomes extreme, and the patient succumbs before the opportunity for the performance of a secondary amputation arrives. A considerable difference exists in this respect, however, between the treatment of the upper and lower extremities. In the former a considerable proportion of the cases survive, while of the latter the large majority of the patients die from shock and septicemia during the next 36 hours if the amputation needs to be made through the thigh.

The Relief of Gas Pains After Appendicectomy. T. A. KENEFFICK, New York, *New York Medical Journal*, November 7, 1914.

In fifteen successive cases, Keneffick has obtained complete relief by the following method: He administers 20 grams of acetyl salicylic acid ester, with five grains of bicarbonate of soda and one grain of calomel, in two or four ounces of water the afternoon preceding the operation. This is followed by an enema the next morning. The dose varies with the age of the patient. If signs of distension appear after the operation, ten grains can be given the next day.

Experimental Pyloric Stenosis. W. W. HAMBURGER and J. C. FRIEDMAN, Chicago, *Archives of Internal Medicine*, November 15, 1914.

1. Moderate pyloric stenosis in dogs (ligature around pylorus tied loosely) causes little or no change in stomach mobility, acidity or size. 2. Marked obstruction causes motor insufficiency, continuous secretion (hyper-acidity) and hypertrophy and dilatation of the stomach. 3. Complete occlusion results in inanition, vomiting, convulsions and death of the animal in from 48 to 120 hours. 4. The pyloric ligature (stenosis) results in motor insufficiency with food retention, which in turn sets up a continuous secretion with the constant presence of free hydrochloric acid. 5. Pyloric obstruction with resulting motor insufficiency and continuous secretion are probably the most important factors in the production of chronic experimental ulcer. 6. While the foregoing results concern experimental chronic ulcer, it is more than likely that primary partial pyloric stenosis (from whatever cause) with secondary motor insufficiency and continuous secretion are largely responsible for the progression and delayed healing of chronic ulcer in man.

A New Diagnostic Sign of Appendicitis. (*Zur diagnose der appendicitis*). C. HORN, *Zentralblatt für Chirurgie*, October 3, 1914.

Horn's sign consists in pain caused by pulling the right spermatic cord. This sign he rated in 12 out of 15 cases. In obtaining the sign, it is necessary to avoid pressure upon the testis; the cord is grasped above the testis and gently pulled. The pain, according to the author, is due to irritation of the peritoneum in the neighborhood of the internal inguinal ring.

The Relief of Sterility by Means of Permanent Epididymostomy With the Formation of an Artificial Sac for the Storage of the Sperm. V. D. LESPINASSE, Chicago, *Journal of the American Medical Association*, November 28, 1914.

Lespinasse says that the types of sterility in a male are all cases of obstruction of the vas above the internal abdominal ring and almost all cases of obstruction of the ejaculatory ducts. His work represents seventy-nine operations. To try to relieve patients he experimented in three ways to make a sac to contain the glandular secretion; first by making the sac of the tunica vaginalis and then covering the cut surface of the epididymis and the contiguous surfaces of the testicle with a piece of thin rubber sheeting. Second, by making the sac entirely of this rubber sheeting sewed to the reflected capsule of the epididymis. Third, by removing the tunica vaginalis completely and placing the entire testicle and epididymis in a rubber bag. The technic is described as follows: "The tunica vaginalis is exposed as for an ordinary operation for hydrocele. The parietal layer of the tunica vaginalis is then cut, thus exposing the testicle and the epididymis. Epinephrin is now injected beneath the capsule of the epididymis, commencing at the top of the globus major and continuing down to the junction of the globus major with the body of the epididymis. An incision is made in the center of the epididymis commencing at the top of the globus major and continuing down to the junction of the globus major with the body of the epididymis. The epididymal capsule is now dissected off, thus exposing the epididymal tubules. The tops of these tubules are now cut off or hair threaded through them. The sac is made as follows: The rubber sheeting or tunica vaginalis is sewed to the reflected capsule of the epididymis in such a manner as to form a closed sac. The testicle is now replaced in the scrotum and suitable dressings applied. With the above-described technic we can produce a sac into which the sperm will discharge and continue to live. This sac can be tapped whenever sperm are desired for impregnating purposes. This operation will relieve all cases of male sterility in which there is a functioning testicle."

Operative Treatment of Acute Epididymitis. D. O. SMITH and B. H. FRAYSER, Canal Zone. *Annals of Surgery*, December, 1914.

Acute epididymitis warrants early surgical interference, these authors assert. Moreover, they claim that the extent of damage to the tubules is decreased by operation, that pain is relieved at once, and that recovery is made more rapid and complete. The evidences of a frank infection in acute epididymitis is so well marked in its local and systemic manifestations that there should be no hesitation to operate.

They advocate an incision in the tunica vaginalis, external and parallel with the epididymis, and large enough to deliver the testis. Multiple punctures are made in the inflamed parts of the epididymis with a blunt probe. These parts are gently massaged, washed with warm saline solution, and the testicle returned to the scrotum. A small gauze drain is used. A suspensory bandage is employed for support. The after treatment is simple.

[For many cases a small incision directly over the epididymis will suffice. A slender piece of rubber tubing makes a more satisfactory drain. The usual hot rectal irrigations should not be neglected. A "Bellevue" adhesive plaster bridge gives convenient support for the scrotum.]

Concerning Cystography. (*Ueber Zystographie*) O. ZUCKERKANDL, *Münchener Medizinische Wochenschrift*, No. 35, 1914.

The use of the X-ray for determining the presence of tumors within the bladder has, according to Zuckerkandl, not been popular owing to the simpler diagnostic help offered by the cystoscope. There are cases in which the cystoscope cannot be introduced into the bladder and others where no definite picture is elicited by the cystoscopy. In such cases Zuckerkandl has found the injection of collargol most serviceable. Inasmuch as the collargol shadow often embraces the tumor masses and conceals them, Zuckerkandl first radiographs with collargol in the bladder, then empties the latter and refills it with air. A second X-ray picture is taken with the bladder inflated and the contrast is most striking and instructive. Villous polypi of the bladder, pedunculated tumors of the bladder—infiltrating carcinomata and hypertrophied prostates are in this way brought into strong relief. In certain cases of large diverticulation when the cystoscope does not give complete pictures, this method can be supplemented.

Further Results in the Electrolysis Treatment of Cystitis. C. RUSS, London, *Lancet*, October 31, 1914.

"After the urine is voided a special catheter is passed into the bladder, but no lavage is undertaken. A few ounces of fluid are then passed in, and the catheter with a glass tube attached is fixed upright by a clamp; this makes a fluid system of the bladder, the catheter, and the tubing. The upper level of the fluid is seen through the glass tubing to rise and fall with respiration. A lint-covered metallic belt encircles the lower trunk at the hip level and is connected to one wire of the battery. The other wire (platinum) is passed down the catheter and conveys the current through the fluid to the interior of the bladder. Radiating from the perforations around the catheter eye numerous electric streams pass in all directions through the bladder and lower trunk to reach the metallic core of the belt. In this way we have an electrochemical action penetrating the bacteria and the entire vesical tissues. This action goes on for an hour or an hour and a half at each treatment. While the treatment proceeds the bladder is being gradually distended by the incoming urine and its recesses become exposed to the forces at work. The patients are unaware of the current's flow and recline at their ease, being occupied in reading and often also enjoy a smoke. If any pain or discomfort is felt it is certain that something in the arrangements needs readjustment."

There is gradual diminution of pus in the urine, with disappearance of the bacteria. Subjectively, there is diminished frequency of urination. As far as the experience of the author goes, the results are permanent. Russ believes the action of the electrolysis depends on a slow destruction of bacteria, with phagocytosis following congestion of the bloodvessels of the bladder. Its effect is therefore comparable to the Bier treatment of inflammations.

Extraperitoneal Rupture of the Bladder; Its Surgical Management. EUGENE FULLER, New York. *Journal of the American Medical Association*, December 12, 1914.

Severe violence in the suprapubic or perineal region may cause extraperitoneal rupture of the bladder, and the worst cases are those associated with fracture of the pelvis. It generally occurs in the region of the trigonum under the space of Retzius, less frequently above and at the side of the vesical neck. The injury is usually single and, if slight, may be treated expectantly, leaving the patient with nothing more than a corresponding area of periosteal sclerosis with slight or severe symptoms, according to the extent and position of the lesion. In most cases, however, expectant treatment invites a fatal result on account of the extravasation and burrowing of urine, which may involve the perinephritic region or even the thigh. There are no strikingly characteristic symptoms, and often the injury remains undetected until the inflammatory symptoms or burrowings attract attention. Hematuria follows the accident and may be slight or extensive.

In the former case there is sometimes no retention of urine. There is always pain, sometimes severe, on urination, but it may be masked by other pains following the traumatism. There is apt to be marked febrile disturbance. When seen promptly the differential diagnosis is between anuria, intraperitoneal and extraperitoneal rupture. In a case indicating bladder rupture seen at once the patient should be instructed to urinate, and if he can do so naturally and it shows no blood the chance is that the bladder is not injured, but if he cannot urinate a sterile catheter should be passed. If no urine appears, the probability is of an anuria from shock. The abdomen should be carefully watched, however, and after a little time the sterile catheter should be reintroduced and a measured amount of sterile normal saline solution be injected. If this is caught on the return flow, well and good; if not, the abdomen should be promptly opened and an intraperitoneal rent looked for and closed, if found. If not found, extraperitoneal injury should be looked for, a catheter introduced and the distention of the bladder watched. The abdominal wound should then be closed and the bladder opened suprapubically and drained. If the bladder contains blood-clot, or if there is retention due to involvement of bladder neck or deep urethra, suprapubic cystostomy should be promptly performed, and if there is then any indication of rupture involving the peritoneum, any rents should be closed. If suprapubic cystostomy discloses extravascular rupture, and there is reason to believe that there is no great degree of urinary extravasation as yet, nothing further need be done than the drainage. In most cases prompt surgery has not been available, and if the burrowing has been enough to show externally it will be found that the bladder has been opened suprapubically or perineally, or perhaps both. An incision is usually made, draining off the pent-up fluid, and probably may save life, but it does not cure, as the drainage is only partial. Another error is in cases in which the burrowing point is far from the bladder and suppuration is then falsely diagnosed as local. Formerly Fuller has advised drainage of such pockets, and after this dissection to reach that pocket. He now reverses that process and dissects first. All these extravasations tend to point to the most dependent part and that should first be opened. It will then be found a much simpler matter to trace the track of the burrowing, and, when the limit of extension is located, an external incision can be made down on the end of a probe and drainage tubes introduced. More than one external connecting incision may be necessary if the burrowings have extended in more than one direction. Each step of the operation in these cases is described at length and illustrated in his paper. Three cases are reported.

Some Experiences with Alcohol Injections in Trigeminal and Other Neuralgias. WILFRED HARRIS, London. *Journal of the American Medical Association*, November 14, 1914.

Harris reports his experience with alcohol injections in neuralgia. He cautions against injection directly into a mixed nerve, such as the sciatic, on account of the motor as well as sensory paralysis it will produce. Many patients who have been thus operated upon have escaped paralysis by their good luck in the operator missing the nerve trunk and injecting around its sheath. He gives a case of his own experience which is instructive as regards this point. He has had experience with some two hundred cases of chronic trigeminal neuralgia. The first division is seldom involved alone, the second is usually also implicated. The supraorbital is the only branch of the first division Harris attacks. Attempts to reach the infraorbital branches he thinks dangerous and needless. The second division or superior maxillary nerves can be reached with advantage either at the foramen rotundum in the sphenomaxillary fossa, or at the exit of the infraorbital nerve on the cheek. In a majority of cases the pain is referred to the upper jaw and the nerve must be attacked at the foramen rotundum; this is difficult, while the other injection is easy. Harris uses two routes for this posterior injection; the first, and preferably, through the cheek in front of the coronoid process and behind the

superior maxilla. If the coronoid process of the mandible comes too far forward or the antrum bulges backward, it may be hard to direct the needle between these parts and in front of the external pterygoid plate so as to enter the sphenomaxillary fossa. In such cases he tries to reach the nerve from behind the coronoid process, passing the needle through the cheek about 4 cm. in front of the middle of the internal auditory meatus on the line drawn from the incisura notch to the bottom of the ala nasi so as to pass over the bottom of the sigmoid notch on the lower jaw. With this the needle passes slightly upward and forward and the pterygoid plate is felt for. The injection of the third division at the foramen ovale is much more certain and easy. For this he uses roughly Levy and Baudouin's line. Full details of these methods are given, too minutely to be abstracted, as is also the injection of the gas-serian ganglion and the anatomical exceptions to the usual conditions provided for. In over sixty cases in which he has injected this ganglion he has seen in one slight diplopia due to sixth nerve weakness appear immediately and last for three months. In another case there was temporary vertigo and nystagmus for which he cannot easily account. Almost always Harris finds loss of taste occur immediately after injections of the third division of the fifth nerve confined to the anesthetic half of the tongue in proportion to the depth of the anesthesia. This lasts as long as the anesthesia and he has seen it two years after injection. This occurs immediately, proving that taste fibers from the tongue pass along to the gasserian ganglion via the third division. He has encountered two patients who suffered from paroxysmal neuralgia in which the paroxysms began in the throat or posterior palatal region on one side and spread into the ear and in front of the ear on to the cheek and down the side of the neck. In each case no relief was given by an injection of the third division of the fifth, and Harris considers these cases of geniculate neuralgia such as are described by Pierce, Clark and Taylor. Post-therapeutic neuralgia should never be treated by alcohol injection or any other operative measures, as it makes the cases worse even if they may appear at first to be relieved. He has seen decided benefit in chronic fibrositis and brachial fibrositis from alcohol injection. Migrainous neuralgia is rarely benefited, but the post-influenza or periodic supra-orbital neuralgia may be sometimes completely cured by a single injection. It is in chronic trigeminal neuralgia that most cures are obtained.

Clinical Classification of Ethmoiditis. E. M. HOLMES, Boston. *Journal of the American Medical Association*, December 12, 1914.

HOLMES, discusses the clinical classification of ethmoiditis. It is needful, he says, that we should remember the important function of the ethmoid and middle turbinate in regulating the temperature of the respiration. When for any reason the middle turbinate and lower wall of the ethmoid have been sacrificed, it practically puts the patient in the condition of a mouth breather. In treating the ethmoiditis the most important thing is "to ascertain, so far as possible, the degree and extent of the existing pathologic conditions, to learn of the duration of the disease and whether there have been previous attacks, to consider the inconvenience of the existing ethmoid disease to the patient, the degree of extension into other structures and the inconvenience as well as the danger due to this extension. It is likewise of great importance to consider the patient's general condition, his hygienic surroundings, his habits and previous treatment, if any. After having gone over the individual case, unless we are sure that the whole ethmoid structure is beyond repair, I believe it is our duty to make the patient understand that it will give better results in his case to save all the nasal structures possible and tell him that in trying to obtain this final result several operations may be necessary." With this understanding we should do what seems necessary, even to the most thorough radical operation. We have to consider carefully the condition of the frontal and sphenoid cells and the effects of irritation from associated nerve filaments, especially the dental. Holmes first divides ethmoid disease into two classes: the purulent and the

non-purulent. The latter may be either an acute or a chronic inflammatory condition, a degenerative, a syphilitic, a tuberculous or a neoplastic. The purulent may be either acute or chronic. Both types may occur independently or be associated. The acute inflammations are very common and usually associated with attacks of acute rhinitis, and in the majority of cases are self-limited. They are often difficult to diagnose, and when the drainage is not materially obstructed the symptoms are slight. If there is an associated purulent secretion coming from some of the ostia, the diagnosis is easier. While the majority are self-limited, some may become chronic, and we should be on the lookout. The general condition of the patient should be attended to, the gastro-intestinal tract kept right and the patient protected from exposure or fatigue. Locally much can be gained for diagnosis by a systematic application of cocaine about the ostia, carrying it on a small-tipped applicator saturated with 5 or 10 per cent. solution directly to the anterior portion of the middle fossa under the tip of the middle turbinate. If this gives only slight or no relief, the next application should be made at the posterior end of the middle fossa, and after this the floor of the nose can be anesthetized and a thorough examination made. In an acute case in which the first application establishes drainage, the repetition of the treatment with the addition of argyrol is usually sufficient to cure the patient in a short time. There are cases in which this cannot give relief and more radical treatment is required. Chronic suppurations vary much in degree and severity of symptoms. The pus that flows backward into the pharynx may be distressing and very disagreeable when it forms decomposing crusts. Sometimes disturbances within the orbit may occur and pain be felt externally over the nose and in the temple region. Polypoid formation may exist for years without purulent manifestations. Unless there is thorough removal of the growth it is almost sure to return, and in advanced cases radical exenteration is required. Syphilitic disease may show the signs of a purulent ethmoiditis, and this should be kept in mind and, when discovered, operation deferred until specific treatment has been given. Neoplasms of the ethmoid are very rare and frequently beyond treatment when discovered. Any soft vascular tumor within the nose should arouse suspicion and receive immediate attention.

The Direct Method of Intralaryngeal Operation.

CHEVALIER JACKSON, Pittsburg, *Journal of the American Medical Association*, November 28, 1914.

According to Jackson, the direct method is the only one for operating on the larynx in children; the indirect or mirror method is applicable only to adults. The difficulties of the direct method require long and constant practice in the operator but not nearly to the same extent as in the mirror method. No one method can be said to be best for all cases and all operators. The laryngologist should try all methods and instruments to learn which is the best for him to use. No anesthetic, general or local, is necessary for operations on the larynx in children. Cocain is dangerous in any case and general anesthesia is absolutely contra-indicated in all cases with even the slightest degree of laryngeal stenosis. Local anesthesia should be used in adults. General anesthesia, preferably ether, being required only when cocaine is contra-indicated or when the ischemia accompanying its use causes the growth to shrink so as to hinder accurate removal.

A New Physical Sign in Certain Lesions of the Lumbar Spine.

LEONARD W. ELY, San Francisco. *American Journal of Orthopedic Surgery*, October, 1914.

In various lesions of the lumbar spine, inflammatory and traumatic, if the patient be laid upon his face, when his knee is flexed his pelvis on that side will rise from the table. The exact reason for this phenomenon is somewhat difficult to understand, but it helps to differentiate lumbar from sacroiliac lesions, having possibly in the former the same value as Kernig's sign has in the latter.

Fractures of the Neck of the Femur; Its Treatment.

JOHN B. WALKER, New York, *New York State Journal of Medicine*, December, 1914.

1. Fracture of the neck of the femur occurs under fifty years of age more frequently than was formerly believed.

2. Any injury to the hip followed by disability should suggest the possibility of a fracture of the neck, and requires an expert examination aided by an x-ray photograph.

3. Reduction of the deformity with complete immobilization of the fracture during the period of repair by means of a plaster spica bandage is advised in all suitable cases.

4. This is to be followed by early gymnastic movements, active rather than passive.

5. All weight-bearing upon the fracture is to be avoided for from four to six months, in some cases even longer.

A New Method of Hastening Repair After Fracture.

H. J. KAUFFER, New York, *New York Medical Journal*, November 21, 1914.

Kauffer suggests the use of powdered bone mixed with petrolatum to the consistency of bismuth paste, which is injected between the divided ends of the fracture with the object of stimulating more rapid bone formation. The author has not tried his method in human beings, but in experimental work upon animals he claims that he has obtained more rapid formation of bone than in control animals.

Penetration Radiotherapy in Surgical Affections, with Special Reference to Surgical Tuberculosis.

(*Zur Röntgentherapie bei chirurgischen Krankheiten, mit besonderer Berücksichtigung der chirurgischen Tuberkulose*). J. OEHLER, *Münchener Medizinische Wochenschrift*, No. 40, 1914.

Formerly the X-ray was employed only casually in inoperable malignant tumors, in recurrences and after incomplete operations. Now the X-ray is used systematically in such circumstances and also in a great variety of other surgical diseases. The author has had favorable results in treating bone and joint tuberculosis, in abdominal and gland tuberculosis and tuberculosis of the epididymis; also in one case of actinomycosis of the jaw. Strumata were also favorably influenced in some cases, though the result was not as satisfactory as in tuberculous affections. Concerning malignant growths, those that are inoperable should and must be rayed; recurrences should likewise be treated by radiotherapy. But operable cases should and must be treated surgically whether it be carcinoma or sarcoma. The only exception is the superficial canceroid of the face, which is very amenable to the ray treatment.

Experiences in the Treatment of Malignant Tumors by Radium.

RICHARD SPARMANN, Vienna. *Annals of Surgery*, November, 1914.

Sparmann reports his chief's, von Eiselsberg's, experience with radium in malignant tumors. Only inoperable cases were treated. In the beginning large doses of radium irradiation were employed; later much smaller doses, since it was found that the large doses produced destruction of healthy tissues in the tumor zone and that the patient's general condition suffered measureably. Of 52 cases treated, curatively as well as preventively, only 11 remained free from tumors. The writer is clear in his emphasis that recurrences were sometimes hastened by post-operative irradiation, that the general ill-effects, such as tachycardia, weakness, vomiting, were often distressing, finally that the dangers of hemorrhage or perforation of a hollow viscus were by no means negligible. For these reasons the author believes that the hopes placed in radium as a new and successful method of treating malignant tumors were not realized.

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CONTINUOUS ANALGESIA AND ANESTHESIA WITH SOMNOFORM—THE TECHNIC OF ADMINISTRATION.

WM. HARPER DEFORD, A.M., D.D.S., M.D.,
Des Moines, Iowa.

The use of highly volatile and rapidly eliminated anesthetics has immeasurably broadened the scope of the expert anesthetist's work in rendering the routine operative procedures of dentistry, minor surgery and the specialties, *painless*. Also the same agents and methods of administration serve equally well for brief periods of surgical narcosis, without the dangers incident to ether or chloroform and the occurrence of untoward post-anesthetic complications.

While ethyl chloride has been available as a general anesthetic for a number of years, its use for continuous analgesia and anesthesia by nasal administration has been deferred, owing to the lack of a suitable apparatus for its administration. The DeFord inhaler, devised and developed for the administration of ethyl chloride in combination with methyl chloride and ethyl bromide—*Somnoform* now provides the expert anesthetist with a simple, efficient and easily portable device for continuous analgesia or anesthesia.

DESCRIPTION OF APPARATUS.

The essential parts of the device, as illustrated (Fig. 1) are (1) a Capsule Chamber, in which the ampoules containing the anesthetic are fractured; (2) a Gauze Chamber to prevent the entrance of shattered glass into the apparatus; (3) a Rubber Bag to hold the volatilized anesthetic; (4) a Regulating Valve, controlling the volume of the anesthetic vapor and the admixture of air; (5) a Nasal Cover, with a sponge rubber cushion to render it air-tight and adaptable to varying physiognomies, and an Expiratory Valve, controlled by a milled cap, by the turning of which rebreathing may be governed; and finally, (6) a Mouth Cover, used during the induction of analgesia or anesthesia, to avoid too great dilution of the anesthetic vapor by oral breathing. Attached to the tube leading from the anesthetic bag to the nasal cover, is a support to render the apparatus more stable, when strapped to the head, and allow the operator the freedom of both his hands. The mouth cover is adjusted to the proper position by means of an adjusting rod and set screw, and it may be put out of the way by letting it fall back into a slip-joint on the nasal cover.

ADJUSTING THE APPARATUS.

Assemble the appliance with the exception of the

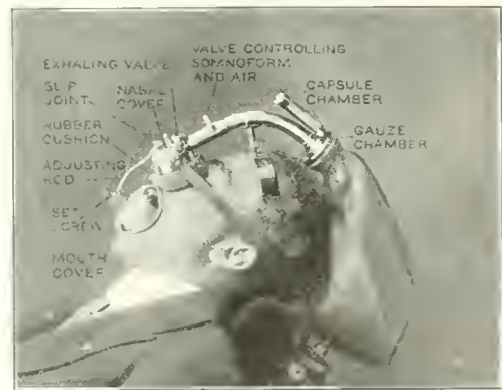


Fig. 1. The DeFord Inhaler and Its Various Parts.

mouth cover. See that the lever regulating the valve is pulled down as far as it will go, this prevents the anesthetic from escaping. With the gauze chamber lightly packed, place an ampoule of somnoform in the breaking device, replace the top of breaking device and press upon it until a slight explosion is heard. The somnoform is now locked in the appliance and cannot escape till liberated.

For operations on the teeth under analgesia the mouth cover is not needed. For removing adenoids, tonsils, etc., under analgesia the mouth cover is important.

For extraction of teeth, removing tonsils, adenoids, etc., under anesthesia the mouth cover is necessary.

Now adjust the appliance by placing it over the nose, fasten the strap around the head, and arrange the extra support to stabilize the apparatus.

When the mouth cover is to be used, with the mouth prop in position, slip the mouth cover over its retaining pin, adjust it on the rod so it covers the mouth accurately, and tighten the thumb screw. With the exhaling valve open to its fullest extent, anesthesia induction may now begin.

THE INDUCTION OF ANALGESIA.

It is advisable to complete the painless part of all operative procedures before beginning the induction of analgesia. When all is in readiness the patient is allowed several breaths of air, then the lever of the regulating valve is raised slowly, and the anesthetic gradually admitted in increasing volume. The lever is raised until the lazy winking of the patient's eyelids indicates the onset of the anesthetic's obtunding effect. Only several more inhalations will then be necessary for an analgesia of brief duration. It is not desirable for the patient to lose consciousness. At this stage operating may be commenced, increasing the pressure and speed of the bur if no pain is felt. When a plane of satisfactory

analgesia has been reached, the regulating lever should be pressed down to shut off all or nearly all of the anesthetic. The beginner will do well to exclude all Somnoform at intervals, admitting a fresh supply of the vapor as needed. The expert, with increasing experience will be able to manipulate the regulating valve to admit just the required amount of fresh vapor to make the analgesia smoothly continuous. During continuous analgesia the depth of the obtunding effect is controlled, not only by the regulating valve, but also by the tidal volume of the patient's respiration. It is surprising how quickly patients accustom themselves to co-operate with the dentist, by lightening or deepening the plane of analgesia by increasing or diminishing their respiratory excursions. Also, when operating without the rubber dam, the lips may be closed at intervals to offset the dilutant effect of oral breathing. The supply of Somnoform vapor is renewed by fracturing fresh ampoules in the capsule chamber.

THE INDUCTION OF ANESTHESIA.

To induce complete surgical anesthesia, the anesthetic vapor is gradually admitted by raising the lever of the regulating valve. The rapidity with which this can be done will depend entirely on the reflexes of the mucous membrane in accepting the gradually concentrated vapor of the anesthetic. If the patient manifests no uneasiness, the lever may be rapidly advanced until the patient is breathing pure Somnoform vapor and exhaling it through the expiratory valve. Continuous anesthesia may require various degrees of rebreathing, which is accomplished by closing the expiratory valve entirely or partially, and by allowing the rebreathing of pure anesthetic vapor to and fro from the bag, or admitting varying percentages of air as the exigencies of the narcosis may require. The anesthetist who has acquired considerable skill in the use of Somnoform for short administrations will find the DeFord inhaler and the nasal technic a very satisfactory method of conducting anesthetics lasting upward to 15 or 20 minutes. Continuous anesthesia is preferable to repeated administrations, particularly if hemorrhage can be controlled and the patient kept from swallowing blood; a complication which usually results in nausea and cardiac depression from the diaphragmatic spasm during the efforts at vomiting. In the event of repeating the administration at the same sitting, sufficient time should elapse for the patient to fully recover from the first administration, and this interval should be used to cleanse the mouth and control hemorrhage to avoid spasm of the glottis from the weight of the accumulated blood. The

aspirator is a valuable adjunct to satisfactory continuous anesthesia in all instances in which there is troublesome bleeding. The assistant should move it across the base of the tongue to keep a clear, bloodless field for the operator.

SIGNS OF ANALGESIA AND ANESTHESIA.

During analgesia the patient merely feels drowsy, the eyelids wink lazily, and there is some tingling and numbness of the extremities. The patient can talk, and is conscious of everything that is being done, but is insensible to the pain of light operating. He is able to assist the operator by moving the tongue or jaws, and clearing the mouth. With the onset of anesthesia there is loss of consciousness, muscular relaxation usually supervenes, the eyeballs roll upward, while the pupils noticeably dilate, and breathing becomes rhythmic and automatic as in sleep. As anesthesia deepens the dilatation of the pupil becomes marked, and the eyeballs become fixed, while the corneal reflex is lost and snoring or stertorous respiration supervenes. These signs denote the ultimate plane of surgical narcosis that is compatible with safety. Anesthesia continues to deepen for some 15 seconds after the last inhalation of the anesthetic vapor, and then elimination begins and is generally completed in about one minute, although there is a workable period of analgesia during recovery, which may be utilized to good advantage.

UTILITY OF SOMNOFORM ANALGESIA AND ANESTHESIA IN DENTISTRY AND SURGERY.

The progressive dentist is finding an ever broadening and more profitable field for the use of analgesia in the painful operations of dentistry, such as lancing abscesses, pyorrhoea technic, excavating sensitive dentine and removing pulps. Analgesia is sufficiently painless for all dental operations except the extraction of teeth and the removal of vital pulps surgically. Also it is invaluable not only in sparing the patient pain and nervous tension, but also in saving the dentist's time and enabling him to do more thorough work. Dental operations fail, not so much because dentists do not understand correct cavity preparation, proper tooth and root formation for crowns and abutments, and the necessity of thoroughly removing all calcarious concretions in pyorrhoea, but *without analgesia* patients many times will not endure the pain necessary to perform the operation thoroughly.

Somnoform anesthesia is also very serviceable in such operations of minor surgery as the opening of abscesses, tenotomies, removal of tonsils and post-nasal adenoids, aural, nasal and uterine polypi:

the application of the actual cautery, passive movements of stiff muscles and joints; eversions of toe and finger nails, removal of external piles, drainage tubes; in curetage, dilating urethral strictures and reducing dislocations. While the use of a mouth-prop during analgesia is optional with the operator, a patient should never be surgically anesthetized with Somnoform for such operations as the extraction of teeth or the enucleation of tonsils and adenoids, without a mouth-prop being inserted between the teeth in advance of the induction of narcosis. Occasionally spasm of the masseter muscle is met with, and this complication may prove very annoying, even dangerous, unless this precautionary measure to conserve an open airway has been adopted. Also it is important for the tyro to remember that the regulating valve of the apparatus must be closed before fracturing a fresh ampoule in the capsule chamber, otherwise the patient, already anesthetized, would inhale an overwhelming volume of the anesthetic vapor. After the bag has been filled with the new supply of vapor, the lever of the regulating valve is gradually raised until the required percentage of anesthetic vapor and air admixture has been reached.

PRELIMINARY STUDY AND PREPARATION OF THE PATIENT.

The dentist or expert anesthetist, who is to administer any general anesthetic, may, with advantage, cultivate the habit of gathering for himself valuable information as to the patient's physical condition without the patient's knowledge. He may detect at a glance whether the patient is young or old, thin or corpulent, feeble or robust, nervous and excitable or calm and without dread, temperate or alcoholic, showing shortness of breath or normal respiration. Even serious impairment of the heart or kidneys may be suspected by the careful observer.

It is always profitable to note the degree of nervous tension, since this may influence the patient's conduct during anesthesia or analgesia. This is particularly true when fear leads to muscular rigidity, gripping the chair, locking the jaws, and opposing the anesthetic. Signs of intoxication in even mild degree should be carefully looked for, since anxiety leads many patients to take "a bracer" before entering the office; and even a small amount of alcohol may necessitate the use of much larger quantities of Somnoform to control the excitement stage of narcosis. Again, patients are met with who are in an absolute state of exhaustion from pain and insomnia, and in these analgesia and anesthesia may be readily induced, and occasionally

persons in this condition pass into a profound natural sleep, after recovery from the anesthetic, from which they are with difficulty aroused, and which is very disconcerting to the anesthetist.

The extremes of age are no contra-indications to Somnoform analgesia or anesthesia, except that in the presence of arteriosclerosis due care must be exercised not to allow any imperiling degree of respiratory embarrassment to supervene, which might precipitate a stroke of apoplexy. Elderly persons who show prominent veins in the neck and temples must be anesthetized very gradually with plenty of air in the early stages. The same is true for plethoric and obese patients, who seem to require excessive oxygenation in comparison with



Fig. 2. Mouth Cover Elevated to Permit Operative Procedures.

anemic individuals. Nervous and frightened patients cause the anesthetist more anxiety and are really more hazardous risks than the frail and delicate subjects who present pathological complications, but have no dread of the anesthetic. During the induction of narcosis nervous individuals are subject to imperiling drops in blood pressure, due to psychic impressions, and their idiosyncrasies must be humored until the plane of light anesthesia has been reached. Should there be any question in the anesthetist's mind regarding the safety of administering analgesia or anesthesia to any particular hazardous risk, the respiratory test of Stange and the differential blood-pressure test of McKesson should be used to definitely determine the presence of acidosis and dangerous cardiac conditions.

It should be understood without constant repetition that in preparing a patient for analgesia or

anesthesia any tight clothes, collars and corsets should be removed. Women patients' statement that the corset is loose or has been loosened should not be accepted, but the nurse attendant should see that it is. It is also advisable that about three hours should have elapsed since the last meal.

The expert anesthetist will persuade the patient to yield without opposition to the induction of analgesia or anesthesia. The amount of self-control exerted by patients will be largely determined by the amount of confidence the operator is able to in-

breathing is not interfered with, the patient should be put in that position which facilitates access to the field of operation. For operations, in which etherization is used as an adjunct to Somnoform, the horizontal posture is advisable; although with proper precautions and the use of the French chair-table, patients may be anesthetized in the horizontal and then operated on in any other desired posture.

The use of the aspirator to prevent the swallowing of blood during dental and oral operations has already been advocated, and it is also imperative for the operator to prevent anything else from dropping into the throat during anesthesia. Deaths in the chair from such accidents have occurred and operators, under the circumstances, have been mulcted of heavy damages.

CARE OF THE PATIENT DURING RECOVERY FROM THE ANESTHETIC.

Keeping the patient sitting back in the chair during recovery from anesthesia, and talking quietly and soothingly, will frequently overcome any tendency toward excitement and will prevent nausea. The patient should not sit up to wash out the mouth. It is more advisable to use the aspirator or to swab out the mouth. Also the patient may be allowed to rinse the mouth without raising the head. The patient should remain in the semi-reclining position until all effects of the analgesia or anesthesia have worn off and there is but slight tendency to nausea.

ACCIDENTS.

Somnoform analgesia and anesthesia have been singularly free from the usual accidents of general narcosis. It is very comforting, however, for the administrator to know exactly what to do in case any untoward accidents should occur. Experimental research has determined that in laboratory fatalities respiration has ceased several moments before the heart did. Consequently in clinical instances of embarrassed breathing immediate efforts should be made to re-establish respiration. The apparatus should be withdrawn, and sudden sharp pressure exerted on the abdomen. This stirs up the solar plexus and in most instances is sufficient to re-establish breathing. If not, rhythmical traction of the tongue, associated with artificial respiration by lifting the arms, and lowering them with compression of the chest, should be instituted, about 18 times a minute, and continued until spontaneous respiration returns. Meanwhile 1/100 gr. of nitroglycerin may be dissolved under the tongue, and amyl nitrite or aromatic spirits of ammonia held to the nose.



Fig. 3. Rubber Dam in Use Instead of Mouth Cover.

spire. Nothing will so quickly place the patients at their ease as the realization that the operator knows exactly what he is to do and how to do it. Pleasant, diverting conversation also plays an important part in putting patients in a proper frame of mind for the ordeal of anesthesia.

POSITION OF THE PATIENT.

For many minor surgical operations and practically all dental operations the semi-reclining upright position answers all purposes. The head-rest should be so fixed as to tip the head slightly back, without stretching the neck or embarrassing respiration. The feet should rest comfortably on the foot-rest without the legs being crossed. The hands should lie limp, unclasped in the lap, so that they may be raised by the patient to indicate pain during analgesia or by the operator to determine relaxation at the onset of anesthesia. Providing that

In cardiac collapse 8 or 10 drops of adrenalin in the conjunctival sac will usually cause a prompt and resuscitative circulatory response. Massaging the precordial area and lowering the patient to the horizontal or slight Trendelenburg posture will materially assist in accomplishing resuscitation.

CARE OF THE APPARATUS AFTER USE.

As soon as the operation is over, the gauze in the inhaler should be removed and thrown away, and the rubber bag and sponge cushion sterilized by exposure to dry heat or immersion in an antiseptic solution such as lysol, bichloride of mercury or carbolic acid. Both sides of the bag should be thoroughly dried and powdered with soapstone; all excess of the powder being then removed. Unless this is done the rubber bag and sponge cushion will rapidly deteriorate. All metal parts of the apparatus may be sterilized by boiling. Sterilization of the apparatus is an imperative prophylactic measure against the transmission of communicable diseases.

FLYNN BUILDING.

THE PROPER DEPTH OF ANESTHESIA.

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The purpose of this paper is to present evidence for the belief that the lightest possible anesthesia which will suffice for a given operation is the best. The injurious effects of general anesthesia may be grouped under two heads, (1) direct injuries due to the toxic action of the anesthetic upon the tissues, and (2) indirect injuries caused by the interference of the state of narcosis with physiologic processes. The most important of the indirect injuries are due to asphyxia and to muscular relaxation.

The harmful effects of asphyxia, the causes of this condition, and the means of preventing it are so generally known that it is needless to discuss them here. The same is not true of the harmful effects of muscular relaxation. In fact, many surgeons regard this as desirable, since it facilitates the performance of their work, and, as they believe, prevents so-called "surgical shock."

That full relaxation facilitates somewhat the performance of certain operations, especially laparotomies, we are prepared to grant, though we must deny that it is necessary. Instead of preventing "shock," we believe that muscular relaxation is an extremely potent means of producing it.

Before proceeding further let us explain what we mean by "light" anesthesia. To make this plain we shall describe our own practice. This has been

developed gradually and largely through experience with nitrous-oxid-oxygen anesthesia. It was this which taught us the advantages and possibilities of a light narcosis.

Thirty minutes before the anesthesia is begun a hypodermic of morphia and atropine is given (average dose for adults: morphine gr. 1/6, atropine gr. 1/100). When the services of a skilled anesthetist are to be had we use nitrous-oxid and oxygen, otherwise, ether, given drop by drop on a mask which fits the face closely, is heavily covered with gauze, and has a considerable dead space. We insist that the patient be anesthetized without his becoming cyanotic or struggling. If his respiratory reflexes are so active that they render the maintenance of an open air way difficult, the anesthesia is gradually deepened till the anesthetist has his patient's respiration under control.

Difficulty in keeping an open air way is the only contraindication to light anesthesia, and it is surprising how seldom this is encountered, when the patient has been properly prepared. A short time after the patient has ceased to respond to questions the operation is started. Great care is exercised not to make sudden or violent traction on the tissues, and to employ sharp dissection whenever possible. The effect of each manipulation upon the patient is noted, and if necessary the operation is delayed a few moments until the anesthesia can be deepened. As far as possible the anesthetist is kept informed concerning the steps of the operation and the requirements of anesthesia. For example, during a laparotomy involving a resection of the intestine, once the segment to be resected has been located, very little anesthetic is administered till we are almost ready to close the abdomen. Then after the peritoneum has been closed no anesthetic is given during the remainder of the operation. We insist that the patient be practically awake before he leaves the operating room.

The foregoing description applies largely to the use of ether. When nitrous-oxid-oxygen is used there is no danger that the anesthesia will be too deep, provided cyanosis is guarded against. The depth of anesthesia which we employ corresponds to that of the ether "Rausch" of the Germans.

Post-operative ill effects from this light anesthesia, either from ether or nitrous-oxid, are almost entirely absent. Vomiting rarely occurs.

Nearly every patient except those who have undergone laparotomy is ready to take nourishment three or four hours after operation. In fact, we believe that an unprejudiced observer would say that the post-operative condition of these patients

is as good as that of similar cases operated upon under local anesthesia.

Our experience with this technic has now been of over six years' duration. We have found it to be adopted to all patients except the small class mentioned, and to most of these once they are got under control. We believe that it is so safe that its use renders unnecessary the combination of local and general anesthesia as a routine procedure.

Having thus explained what we mean by "light" anesthesia and having incidentally given the clinical results of the same, we must now return to our original questions, which are the consideration of the ill effects of muscular relaxation and the influence of deep anesthesia upon the production of so-called "shock."

It is a well known fact that the blood vessels are capable of holding several times the entire amount of blood. Since the arteries must always be full, it is evident that the veins and capillaries are not, and it is also evident that the mechanism by means of which the blood is prevented from accumulating in the latter vessels must be essential to life. That muscular contraction is the chief force involved in doing this is proved by the following considerations: (1) The veins of the limbs are provided with valves situated at short intervals apart and arranged so that every force that compresses the veins forces the blood toward the heart. When the valves become incompetent serious venous dilatation occurs, as in varicose veins of the leg. The mechanism just described is powerful enough to raise the blood pressure in the veins to several times the height of the arterial blood pressure, as we have shown by direct experiment. (Gatch—The Effects of Laparotomy on the Circulation. Trans. Am. Gyn. Society, 1914; in press.) (2) The intra-abdominal veins are destitute of valves, and since these vessels alone can hold more than all the blood in the body, something must prevent their filling. This is usually supposed to be accomplished by the vaso-motor mechanism. But that this alone is incapable of preventing a fatal stasis of blood in the abdominal viscera is shown by the following experiment: A dog is etherized till muscular relaxation is produced. Its arterial blood pressure is recorded. That its vaso-motor mechanism is acting well is shown by the maintenance of a normal blood pressure, and by a rise of blood pressure during asphyxia. The dog is now placed in a vertical head-up posture. The blood pressure rapidly falls and is soon almost to the base line. On placing the animal in the head-down posture its blood pressure quickly reaches the normal level. Salt solution is

now injected into the animal's peritoneal cavity till its abdominal walls are distended. If the animal is now placed in the vertical head-up posture, little or no fall of blood pressure occurs. Similar results may be obtained by the use of curare. This experiment clearly shows: (1) The inability of the vaso-motor mechanism to prevent a fatal stasis of blood in the abdomen, and (2) the ability of an adequate intra-abdominal pressure to do so. Since this pressure is normally due to muscular contraction, the role of the latter is evident. Thus it is possible to produce fatal "shock" by deep anesthesia combined with the head-up posture. When we abolish muscular tone there is an accumulation of blood on the venous side of the circulation, and the effect of this is practically that of hemorrhage.

The writer is convinced from both clinical and laboratory experience that operating for ten minutes with the patient under profound anesthesia may do him more harm than operating for an hour under light anesthesia. During a prolonged period of complete muscular relaxation so much blood may be withdrawn from the circulation that all the tissues suffer from a diminished blood supply. This fact must be taken into account in estimating the toxic action of an anesthetic. This indirect action of the drug may be much more harmful than its direct toxic action.

1440 CENTRAL AVENUE.

NITROUS-OXID OXYGEN DOSAGE IN ANESTHESIA.*

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PROPORTION OF GASES IN TIDAL AIR THE ONLY AVAILABLE STANDARD OF QUALITATIVE DOSAGE.

The intensity of the anesthetic action of nitrous oxid is in a measure inversely as the quantity of oxygen with which it is administered. The effect varies from a blunting of pain sense, obtained by administration with percentage of oxygen exceeding that of normal air, down through increasingly anesthetic action, obtained by a percentage of oxygen half that of normal atmosphere; thence down through an increasingly anesthetic and asphyxial action, until finally, with a percentage of oxygen about one-third that of normal air, the asphyxial effect renders the mixture so dangerous that it may be termed unrespirable. The effect of dosage

*Read by proxy, courtesy of Dr. L. S. Booth, Anesthetist to Roosevelt Hospital, during the Second Annual Meeting of the American Association of Anesthetists, Atlantic City, June, 1914.

may therefore be tabulated within certain limits, according to the relative percentage of the two gases maintained for respiration.

GAS TENSION AS A FACTOR.

Additionally the anesthetic action of nitrous oxid is in a measure directly proportional to the tension of the gas dissolved in the arterial blood and central nervous system. Indeed any appreciable dilution of the anesthetic mixture by an inert gas such as nitrogen so lowers the volumetric proportion of normal atmospheric pressure sustained by nitrous oxid in the lungs and results in such low gas tension of nitrous oxid dissolved in the blood, that satisfactory anesthesia cannot be induced. In this connection the well-recognized increased anesthetic efficiency of nitrous oxid administered under a few millimeters of positive pressure can scarcely be cited as an illustration, since the clinical advantage accruing in this instance is no doubt due to the exclusion of air, which so often finds ingress into the apparatus through leaking joints, rather than to additional nitrous oxid dissolved in the blood. It is difficult to imagine that 5 millimeters of positive pressure would add an amount clinically appreciable to the 680 millimeters of tension, more or less, of nitrous oxid in the central nervous system of the anesthetized patient.

AN ACCURATE STANDARD AVAILABLE FOR THE HYDROCARBON ANESTHETICS.

With the lipid solvent anesthetics, decreased oxygen supply is a secondary factor in the depth of anesthesia, the determining one being the actual vapor tension of such agents as ether, dissolved in the neurone. Therefore with these anesthetics, ether and chloroform, it would seem desirable, as urged by Boothby, to adopt a nomenclature of dosage referring to the barometric pressure exerted by the vapor in the lung and the tension under which it is held dissolved in the neurone.

NITROUS OXID STANDARD OF QUALITATIVE DOSE.

With nitrous oxid on the other hand since its efficiency is in larger measure proportional to the deprivation of oxygen, it seems desirable, until further work on the nitrous oxid tension of the blood has been done, to measure and tabulate dosage in terms of relative volumes of nitrous-oxid to oxygen in the inspired tidal volume.

LIMITATION OF THE QUALITATIVE DOSE STANDARD FOR NITROUS-OXID.

It must be recognized that the proportion of gases in the tidal volume is only an approximate index of the proportion of available gases which reach the central nervous system. Oxygen is per-

ishable in the body, and must be constantly refreshed, whereas with nitrous-oxid, no loss being sustained, a partial clinical balance of blood and neurone with alveolar gas is established within six minutes, an almost complete balance within 15 minutes, and a complete physical balance within about 40 minutes, if analogy may be drawn from observations on carbon dioxid. Therefore, after a time it makes no difference with the amount of nitrous-oxid circulating in the blood what the tidal volume of respiration may be, so long as an equal gas pressure is maintained in the lungs. But for the oxygen of the blood to maintain a balance and the anesthetic state to remain in equilibrium, the oxygen intake in the tidal gas of respiration must remain constant in quantity within certain limits, no matter what the percentage may be. In other words, the percentage of oxygen must be raised to compensate for small tidal volume, thus upsetting the tidal proportion standard of dosage.

A second factor to upset the accuracy of dosage gauged by the relative proportion of gases in the tidal volume is an altered capacity of the blood to transfer oxygen. Any diminished rate of blood flow or diminished oxygen carrying power in the hemoglobin must be compensated for by increase in oxygen relative gas pressure both in the tidal volume and the alveolar air for the nerve cell to remain in anesthetic equilibrium.

Clinically it is found that the requirement of individual patients toward higher percentage of oxygen in the tidal volume is common when there is present any marked diminution of tidal volume or of quality or rate of blood flow. The tidal volume is often diminished by obstruction, by breath-holding, by acapnoea and by over-anesthetization.

The oxygen-carrying capacity of the blood is diminished by low hemoglobin content and by decreased rapidity of blood flow; or the carrying capacity of the blood for oxygen is much diminished by anemic and septic conditions; also the relative capacity seems to be lessened and the necessity for a higher per cent. of oxygen is evident in rapidly growing children and in patients of rapidly-increasing weight. The carrying capacity being in direct ratio to the rate and volume of the blood flow is lessened in asthenic states, such as old age, cardiac decompensation and conditions of disease. Any of these factors which decrease the oxygen intake by a lessened tidal volume, or decrease the oxygen carrying capacity of the blood by lessened hemoglobin capacity or rate of blood flow must be compensated for by increase of oxygen in the mixture administered to that patient.

As previously stated, the only practical place to measure the relative proportion of gases is at the intake in the inspired volume, however much this measurement may leave to be desired.

Yet in normal man of average tidal volume the effect of a given proportion of gases can be foretold to a nicety, and in the exceptions noted above the proper level is very quickly found. By the use of a measuring instrument of precision for quantity of each gas as it flows to the patient the administration for a given depth of anesthetic becomes almost a rule of thumb and an automatic procedure.

ZONES OF ANESTHESIA.

If it is conceived for purpose of observation and tabulation that the various stages of nitrous-oxid anesthesia, from slight blunting of pain sense to profound asphyxia may be plotted as on a surface into continuous areas, each marked by definite physical reactions and each induced and maintained by definite proportion of nitrous oxid and oxygen, then these areas may be termed *Zones of Anesthesia*.

The following chart I have tabulated as the average for normal man of good tidal volume. The mixtures and measurements were first made very accurately and automatically by a carefully calibrated anethetometer, working on nicely balanced gas pressures. Later this was abandoned for a less exact but more practicable measurement by the writer's instantaneous gas flow gauges. For guidance in tabulating the slightly asphyxial zones I am indebted to Dr. Walter M. Boothby, for the analgesic zones to Dr. Charles K. Teter. The profoundly asphyxial zones were determined in part by Dr. James T. Gwathmey and myself on the dog. The remaining zones were tabulated from operative cases in routine anesthesia at the Roosevelt Hospital, New York.

These zones were all determined without supplemental narcosis. It may be mentioned in passing, as a point frequently overlooked or understood by the more fanatical devotees of nitrous oxid, that without supplemental narcosis for resistant subjects no zone exists in the range of true nitrous-oxid anesthesia, which is surgically desirable.

UTILITY OF THE ABOVE ZONES.

The Lethal Zone: Equilibrium can never be said to be established in this zone, as fatal asphyxia supervenes in from 3 to 6 minutes. While the percentages of this zone are in common use for short operations, such as extraction of teeth, yet the apyxyial mixtures of this zone should be abandoned for those which induce anesthesia more

ZINCS PHOSPHATE OXIDE-CERAMIC ANALGESIC NON-LOCAL MAN WITH THERMAL SENS							
PERCENTAGE ANALGESIC	ANALGESIC	DETHY ANALGESIC	TEMPER ANALGESIC	TEMPER ANALGESIC	TEMPER ANALGESIC	TEMPER ANALGESIC	TEMPER ANALGESIC
100%	100%	100%	100%	100%	100%	100%	100%
90%	90%	90%	90%	90%	90%	90%	90%
80%	80%	80%	80%	80%	80%	80%	80%
70%	70%	70%	70%	70%	70%	70%	70%
60%	60%	60%	60%	60%	60%	60%	60%
50%	50%	50%	50%	50%	50%	50%	50%
40%	40%	40%	40%	40%	40%	40%	40%
30%	30%	30%	30%	30%	30%	30%	30%
20%	20%	20%	20%	20%	20%	20%	20%
10%	10%	10%	10%	10%	10%	10%	10%
0%	0%	0%	0%	0%	0%	0%	0%

Fig. 1.

slowly and safely. Anesthesia induced by the percentage mixtures of the lethal zone subject the patient to severe cardio-vascular strain, and carry him to within a minute or two of death from asphyxia.

The Profound and Deep Zones also have no proper surgical indication. They are frequently invaded by error during the routine administration and are rapidly retreated from by raising the percentage of oxygen when oncoming asphyxia is observed. By intratracheal insufflation of the mixture a dog may be kept alive in the profound zone for half an hour. Man may be carried in the deep zone if the tidal volume be large and no asphyxial obstruction or thoracic fixation presents, yet the margin of safety is small.

The Medium Zone: The percentage of mixture, even in this zone is advisable only for the first few minutes of induction, as the zone yields an undesirable degree of asphyxia characterized by a slight cyanosis, occasionally muscular rigidity, by stertor, and by cardio-vascular strain. Some anesthetists utilize the physiologically disadvantageous asphyxia of this zone erroneously for additional degree of relaxation in resistant subjects. Relaxation cannot be secured in this zone in resistant subjects, but can only be secured by raising the percentage of oxygen and by supplemental narcosis; such narcosis as is attained by a small addition of ether.

The Light Zone: This is the one of greatest utility for abdominal surgery. The perfect relaxation of the hydrocarbon anesthetics is never present. Reflex muscular and respiratory reaction to trauma is always evident unless blocked by local analgesia or by a more effective general anesthetic such as small doses of ether or a large dose of morphine.

The Very Light Zone: This is the desirable one for surface surgery such as amputation of the breast. Both this and the subconscious zone may serve for all degrees of operative work when sup-

plemented by ether. In fact these are the ideal zones physiologically, since in these zones the blood pressure is not raised, the color is normal or even rose pink, the breathing is not exaggerated and there is no asphyxia present.

On the usual volume of delivery of from eight to ten litres of gases per minute, the percentages of oxygen in the gases delivered must be about two per cent. higher than that charted in Figure 1 on account of dilution with expired gases from which the oxygen has been in part absorbed. In patients who are anemic or toxic from disease or whose respiratory volume is small, or who have diminished blood flow, a higher percentage of oxygen is required to maintain the same oxygenation of the tissues. The percentages of oxygen needed in the inspired gases is approximately in direct ratio to the degree of anemia, or intoxication. For example, a patient with 50 per cent. hemoglobin or half the normal oxygen-carrying capacity requires for the zone of light anesthesia 18 to 20 per cent. of oxygen in the tidal volume of respiration, instead of the 11 per cent. mixture required by normal man.

The stimulus of operative trauma elevates the blood pressure 10 to 30 millimeters in all zones, even in the zone of profound anesthetic-asphyxia. Nitrous-oxid has not the slowly induced ether effect in blocking efferent sensations of the somatic nerves by direct action on the nerve ends. Nor does it compare in efficiency as to central nerve cell disassociation with full ether anesthesia. The maximum nitrous-oxid effect is about equivalent to the ether effect obtained by 30 millimeters of ether tension. Whereas full anesthesia under ether with complete disassociation of all the central nervous system from the great primitive medullary centres is accomplished by 50 to 52 millimeters of ether tension in the central nervous system as has been shown in the anesthetic tension investigations of Boothby. Therefore, nitrous-oxid provides no zone which protects against harmful stimuli of operative trauma as do the hydrocarbon fat-solvent anesthetics. Nitrous-oxid should therefore be employed only with the gentlest manipulation of tissue by the operator, or where there is supplemental blockage of centripetal stimuli by local analgesia or by a more effective general anesthetic such as ether, or deep narcosis by morphine or scopolamin.

QUANTITATIVE DOSAGE.

A consideration of dosage would be incomplete where a large avenue of excretion has been utilized and in part blocked, were not also the refreshing of the dose considered. In practice it is found that

a refreshing of the gas at a rate about equivalent in bulk to the normal tidal volume suffices. I have never observed any ill effects from exceeding this rate, such as are alleged to arise from over-excretion of carbon dioxid. Excessive volume, however, is monetary waste.

A satisfactory level of anesthesia cannot be maintained unless the gaseous excrements such as carbon dioxid are washed out at a comparatively normal rate. No smoothness of anesthesia can be maintained on less than six litres per minute, and, in fact, 8 litres per minute (120 gallons per hour) should be placed as the minimal delivery, or to active individuals 10 litres per minute. The interrupted flow method, as set forth by Gatch and others, suffices for unconsciousness with intervals of exaggerated breathing (unless the respiratory center is desensitized by morphin), together with moments of asphyxia; but to maintain a definite level of anesthesia the supply of gases should be in continuous flow by the Boothby, or Teter method.

The working method which I prefer is to set the nitrous-oxid flowing through a Connell instantaneous gas flow gauge, at the rate of 8 litres per minute, the oxygen is set to $\frac{3}{4}$ litre per minute for induction. As soon as slight cyanosis appears, the oxygen is raised to 1 litre and in about 5 minutes to $1\frac{1}{4}$ litres. After 15 minutes it can usually be raised to $1\frac{1}{2}$ litres per minute. If the patient is one requiring larger percentage of oxygen in the tidal air to establish anesthesia in the proper zone, this fact is promptly evident and the oxygen is increased. Rarely is more than 2 litres of oxygen per minute required.

NITROUS-OXID ANESTHESIA ADJUVANTS.

Owing to the intrinsically light character of nitrous-oxid oxygen anesthesia as previously stated, it must usually be supplemented for general surgery by alkaloidal narcosis or light ether anesthesia or both. Morphin with atropin or hyoscin is the recognized alkaloidal adjuvant. Without these adjuvants it is impossible to hold in surgical anesthesia robust, athletic individuals, and those of alcoholic, tobacco, and other narcotic habits without dangerous degrees of asphyxia.

ALKALOIDAL NARCOSIS SUPPLEMENTAL TO NITROUS-OXID.

Preliminary alkaloidal narcosis renders the course of nitrous-oxid anesthesia smoother, increases the depth of anesthesia, allows an increase of 1 to 3 per cent. in the oxygen percentage, and renders the necessity for ether less frequent. However, these narcotics desensitize the respiratory center and increase the danger of respiratory collapse

from asphyxia. Scopolamin or hyoscin also occasionally exercise rapid, powerful depression on the circulatory mechanism. Indeed, I can name a dozen surgical and medical associates who, working amid the human derelicts of the large New York hospitals, have seen this drug in their individual experiences, administered in recognized therapeutic dose, kill like the blow of a slaughter-house sledge.

ETHER ANESTHESIA SUPPLEMENTAL TO NITROUS-OXID.

By proper combination of ether with nitrous-oxid the best points of both of these anesthetics may be secured. By combining the very light or the subconscious zone of nitrous-oxid anesthesia, 11 to 14 or 14-16 per cent. of oxygen, with the light subconscious zone of ether anesthesia, a vapor pressure of 15 to 25 millimeters, a physiologically ideal state of general anesthesia may be induced, for the light transitory anesthesia of nitrous-oxid is secured, together with the relaxation, sensory nerve-end paralysis and post operative analgesia of ether. The asphyxial zones of nitrous-oxid may be avoided on the one hand, while on the other there is no such concentration of ether vapor as actively stimulates mucous secretion in the bronchi, the dosage remaining well below the disassociation level of the vomiting center, present at about 25 m.m. of ether tension, nor do the after effects exceed those of unsupplemented nitrous-oxid administration.

TECHNIC 1: *Supplemental Narcosis by ether when required.* At any time during the course of nitrous-oxid oxygen anesthesia, when it becomes necessary to secure more efficient anesthesia or to establish relaxation, the administration of ether is desirable. This is a far safer procedure than to persist in attempting to subdue the patient by unsupplemented nitrous-oxid anesthesia, by reducing the oxygen supply.

About 86 millimeters of ether vapor pressure, 65 drops of ether per gallon of gas, is necessary to establish an efficient state of anesthesia within reasonable time, from 3 to 5 minutes. When relaxation is secured, the ether is discontinued or reduced to minimal dosage, 20 m.m. of vapor pressure or 15 drops of ether per gallon of gas.

TECHNIC 2: *Routine Relaxation by Ether Vapor.* The patient is primarily anesthetized by nitrous-oxid oxygen. Ether is now slowly added increasing the vapor pressure to about 86 millimeters by adding about 65 average size drops of ether for each gallon of gas, usually two drops per second. At the same time the oxygen percentage may be increased to 12 per cent. When anesthesia is complete and general relaxation has been established,

usually within 6 minutes, the anesthetic state may be readily continued by nitrous-oxid oxygen alone, usually without further recourse to ether.

TECHNIC 3: *Routine Relaxation by Oil-Ether administered by Rectum.* The method of Gwathmey would seem one of great future promise, namely, very light preliminary ether narcosis by rectal administration of small dose of a weak oil-ether mixture. To obtain the desirable mental confusion or subconsciousness and the analgesia and relaxation of the light subconscious zone of ether anesthesia, 15 to 25 m.m. of ether tension; probably a mixture of ether 50 per cent. in oil, half an ounce to each 20 pounds of body weight will suffice administered by the Gwathmey rectal method, $\frac{1}{2}$ hour before operation.

TECHNIC 4: *Routine Combination of Ether Nitrous-Oxid Anesthesia. The Best Method.* By starting the administration of ether immediately in nitrous-oxid administration, adding less than 22 drops of ether per gallon of gas, the dosage of ether vapor may be kept constantly below 30 millimeters of ether vapor pressure. The oxygen content in the tidal gas may be gradually increased to 15 per cent. Thus the safest, most satisfactory state resultant from any general anesthetic is obtained; a state combining the light subconscious zone of both ether and nitrous-oxid into one of deeper yet controllable anesthesia. A proper ether flow is a drop every two seconds for the first half hour; thereafter a drop every three seconds. The gases are best delivered continuously, 9 to 10 litres per minute. Thirty grams of ether per hour and 150 gallons of gases should be used.

SUMMARY AND CONCLUSIONS.

1. The effect of a given nitrous-oxid-oxygen mixture is constant on normal man.
2. The anesthetic effect is in a degree inversely as the proportion of oxygen.
3. The ultimate gas tension which the drug establishes is not at present an available gauge of dosage.
4. The only available gauge of qualitative dosage is the proportion of oxygen with which the drug is administered.
5. The action may be differentiated into consecutive levels or zones of anesthesia, according to the average amount of oxygen present in the tidal gases. For analgesia in normal man the proportion of oxygen in the tidal gases of breathing may exceed 20 per cent. Below this the consciousness becomes gradually abolished until at 16 per cent. the patient slowly becomes unconscious. From 14

to 11 per cent. there is sufficient anesthesia for surface operations; from 11 to 8 per cent. there is sufficient anesthesia for abdominal surgery, associated, however, with slight asphyxia and without proper muscular relaxation. Below 8 per cent. the mixtures are useful only for induction of anesthesia, and below 6 per cent. they become so highly asphyxial that they should not be used even for tooth extraction.

6. Higher percentage of oxygen is required when the tidal volume is below the average, or the oxygen-carrying capacity of the blood is diminished.

7. At least 6 litres of fresh gases per minute are required for smooth anesthesia and to establish normal excretion of carbon dioxide and other gaseous waste products; preferably 8 to 10 litres per minute of a uniform mixture is supplied in a continuous flow.

8. By continuous flow and known dosage with accurate and constant measurement and control the level of each patient may rapidly be found, and after the first 15 or 30 minutes anesthesia may run continuously without further adjustment.

9. Unsupplemented nitrous-oxid-oxygen anesthesia is ineffective to block the centripetal stimuli of operative trauma.

10. Nitrous-oxid-oxygen anesthesia is most advantageously supplemented by ether.

11. Light ether anesthesia, the light subconscious zone of ether, a tension of 15 to 25 m.m. in conjunction with the subconscious or light subconscious zones of nitrous-oxid-oxygen anesthesia, 14-16 or 16-20 per cent. of oxygen is physiologically the most advantageous of all anesthetic states.

12. Owing to present complexity and inaccuracy of administration, the average nitrous-oxid anesthesia, even when effectively supplemented, possesses no practical advantage over properly induced and well-maintained ether anesthesia.

ROOSEVELT HOSPITAL.

FEATURES IN THE APRIL SUPPLEMENT

RESUSCITATION IN THREATENED
FATALITIES DURING GENERAL
ANESTHESIA.

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KIDNEY FUNCTION IN ITS RELATION
TO GENERAL ANESTHESIA.

JAMES J. HOGAN, M.D., M.R.C.P.,
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PROCEEDINGS OF THE SCOTTISH
SOCIETY OF ANESTHETISTS.

THE ADVANTAGES OF COMBINED ANESTHESIA IN THE OPERATIVE TREATMENT OF HEMORRHOIDS.*

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Routine operative methods that have been devised for the treatment of external and internal hemorrhoids under local or general anesthesia are invariably followed by post-operative pain and discomfort entirely out of proportion to the gravity of the condition.

To operate under local anesthesia in rectal cases is usually a tedious procedure, and in a majority of the cases is accompanied by severe pain. Under general anesthesia graver difficulties are experienced, especially during dilation of the sphincter.

A large number of sufferers with hemorrhoids refuse operation, not on account of the length of time necessary for a cure, but because of the severe pain and discomfort that persist for several days after the operation.

It is the object of this paper to outline a method that not only eliminates post-operative pain, but also accomplishes relaxation of the sphincter *without manual dilatation*. It excludes all difficulties in the administration of the general anesthetic; the patient's color remains good and the breathing regular throughout the entire operation.

NERVE SUPPLY OF THE ANAL REGION.

In order to better understand the method used in accomplishing the foregoing results, a brief review of the nerve supply of the anal region is necessary.

The nerves supplying the anus are derived from both the cerebro-spinal and the sympathetic nervous systems. Those originating from the former come from the fourth sacral nerve, and those from the latter from the hypogastric plexus. The muscles of the anal region are supplied by branches of the sacral nerves, while the superficial perineal branch of the internal pudic supplies the levator ani and skin in front of the anus, and the inferior hemorrhoidal branch innervates the lower end of the rectum and anus.

It can readily be seen that since the anus is supplied by the fourth sacral nerve and the branches of the internal pudic, severe local pain and wide distribution of reflex pain will be experienced as the result of operative trauma. Because of the close nervous association between the anus and the outlet of the bladder, we note, on the one

*From the surgical service of Dr. Chas. Goodman.

hand, the frequent desire to urinate as a result of anal irritation and, on the other hand, temporary retention of urine due to the vesical spasm that follows trauma to the anus.

DIFFICULTIES UNDER ANESTHESIA.

In the usual operations for hemorrhoids under general anesthesia, we have all seen how difficult it is to keep the patient fully relaxed and in a safe plane of surgical narcosis. As soon as dilatation of the sphincter is begun, the patient becomes cyanosed and the breathing stertorous. Not infrequently at this time we witness struggling of the patient on the table, due to reflex cerebral stimulation.

manipulation would have no effect upon the course of the anesthesia, nor would the patient be subjected to the markedly severe pain and discomfort that always follow operations for hemorrhoids. With these objects in view I have utilized the principles of Crile's method of anoci-association anesthesia.

THE NEW METHOD OF COMBINED ANESTHESIA.

The method that has been practiced in a series of 16 cases is as follows: The preparation of the patient is the usual method of thoroughly evacuating the bowels. Three-quarters to one hour before the induction of general anesthesia, a hypodermatic injection of morphine sulphate 1/6 of a



Fig. 1.—Case 13. Showing anus before injection.

Dilatation of the sphincter is often completed too rapidly, and as a result of this unnecessarily rough manipulation the mucous membrane is torn and very frequently a hematoma is produced in the rectal wall. Tears in the mucous membrane may become the focus of infection, or give rise to fissures. Hematomas, ultimately, may cause ulceration of the rectal mucous membrane by pressure, with continual bleeding or late secondary hemorrhage.

The excruciating post-operative pain usually persists for 24 to 72 hours. Temporary retention of urine almost always occurs, so that catheterization, with its attendant dangers, becomes necessary.

Realizing that the anal region has been endowed with a large nerve supply, it occurred to me that if I could obtain complete relaxation of the sphincter without manual dilatation and block off the nerve impulses during the operative procedure, then the



Fig. 2.—Case 13. Showing the amount of relaxation of the anal opening after the injection of novocain and quinine and urea hydrochloride. Allis forceps in position.

grain and atropine sulphate 1/150 of a grain is given. Ether by the open drop method is the anesthetic used. The patient is never placed in the lithotomy position until well under the effects of the narcotic. The skin area about the anus is painted with a three and a half per cent. solution of tincture of iodine. Four points are selected about the circumference of the anus, one-half to three-fourths of an inch from the muco-cutaneous junction, corresponding to 12, 3, 6 and 9 on the dial of a clock. A solution containing two parts of a one-half per cent. solution of novocain and one part of a 1/600 solution of quinine and urea hydrochloride is injected into the internal sphincter of the anus at each point. The course of the needle is guided with a finger in the rectum, so that one may be absolutely certain that the needle is in the sphincter and not in the lumen of the bowel.

Almost immediately after the solution is injected the guiding finger feels the sphincter relax. After waiting a minute or two it is possible to insert the breadth of four fingers into the anal opening without any resistance whatever. Also there is no reflex contraction of the sphincter. The hemorrhoids are very readily rolled into view, by placing four Allison forceps at opposite points at the mucocutaneous junction, as seen in Figures 2 and 4. The hemorrhoids are thus easily exposed and whatever method is selected for their removal can be practiced without any difficulty. I have used the clamp and cautery method without putting either a tube or packing into the rectum. The average amount

ing the anesthetic fifteen to twenty minutes before completion of the operation. On recovery from the effects of the anesthetic fifty per cent. of the patients have been entirely free from post-operative pain, according to our charted results. The remaining number have required but one dose of an hypnotic throughout the entire post-operative period.

PROLONGED OBTRUDING EFFECT OF QUININE AND UREA.

I attribute the prolonged relaxation of the sphincter and the absence of the post-operative pain to the continued anesthetic effect of the quinine and



Fig. 3.—Case 16. Shows anal and hemorrhoids before injection.

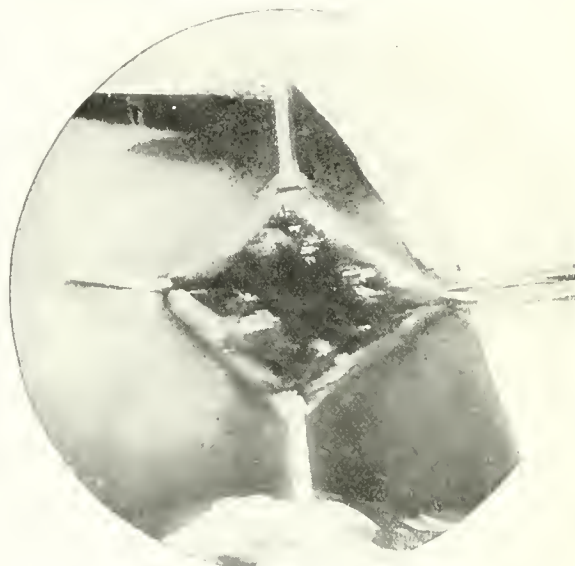


Fig. 4.—Case 16. Shows relaxation of the anal opening, and hemorrhoids brought into view, after the injection of the novocain and quinine and urea hydrochloride.

Chart: Combined Anesthesia in the Operative Treatment of Hemorrhoids.

Case No.	Discharge Number	Date of Admission	Date of Operation	Date of Discharge	Internal or External Piles	Hypnotic Given	Catheterized
1	1187	3/31/14	4/3/14	4/10/14	int.	none	no
2	1223	4/10/14	4/11/14	4/16/14	ext.	none	no
3	1246	4/13/14	4/15/14	4/19/14	int.	none	no
4	1264	4/13/14	4/15/14	4/22/14	both	once	no
5	1358	5/1/14	5/2/14	5/8/14	int.	once	no
6	1418	5/10/14	5/11/14	5/16/14	int.	once	no
7	1490	5/17/14	5/18/14	5/25/14	both	none	no
8	1535	5/18/14	5/20/14	6/1/14	int.	none	no
9	1538	5/26/14	5/27/14	6/1/14	anemia int.	once	no
10	1614	6/3/14	6/3/14	6/10/14	both	once	no
11	1629	6/2/14	6/3/14	6/12/14	int.	once	no
12	1832	7/6/14	7/7/14	7/9/14	both	none	no
13	1847	7/13/14	7/15/14	7/25/14	int.	none	no
14	1864	7/6/14	7/7/14	7/14/14	both	once	no
15	1878	7/7/14	7/8/14	7/17/14	both	once	no
16	1962	7/24/14	7/25/14	7/28/14	ext.	none	no

of novocain and quinine and urea hydrochloride solution used was 15 to 20 c. cm. for each case. The patients maintain a good color and breathe quietly throughout the operation. The amount of ether used in each case has been one-third to one-half the amount necessary under general anesthesia alone. In a number of the cases we have discontinued giv-

ing the anesthetic fifteen to twenty minutes before completion of the operation. On recovery from the effects of the anesthetic fifty per cent. of the patients have been entirely free from post-operative pain, according to our charted results. The remaining number have required but one dose of an hypnotic throughout the entire post-operative period.

For purposes of comparison, I have operated on four cases for hemorrhoids under purely local analgesia, using the solution of two parts of a one-half per cent. novocain and one part of the 1/600 quinine and urea hydrochloride, and injecting this solution into the sphincter and in the same manner as with the method of combined anesthesia. Although perfect relaxation of the sphincter is obtained, and the cautery causes no pain, it is nevertheless a very tedious procedure to keep entirely within the bounds of the analgeric area. The injection into the sphincter renders the skin area analgesic only for a short distance around the mucocutaneous junction of the anus. The pain from the insertion of the needle into the sphincter is severe in itself. Only two of these four cases urinated voluntarily, and all received more than one hypodermatic injection of morphine. With combined anesthesia we have entirely eliminated the necessity for catheterization in every case, and when an hypnotic was necessary one dose sufficed.

ADVANTAGES OF THE COMBINED METHOD.

The disadvantages of both local analgesia or general anesthesia are entirely overcome by the combined method. The advantages of this method may be summed up as follows:

1. *Anesthesia.* Profound anesthesia is not necessary to secure the proper relaxation of the sphincter. Untoward symptoms such as cyanosis and stertorous breathing are entirely eliminated. The amount of general anesthetic used is reduced from one-half to one-third that required under general anesthesia alone, and therefore post-anesthetic general sequelae are reduced to a minimum.

2. *Exposure of Hemorrhoids.* The ease with which the hemorrhoids are brought into the field of operation eliminates unnecessary manipulative trauma, and its direct and indirect complications.

3. *Post-operative Pain.* Fifty per cent. of the patients are without pain after the operation; while the pain in others is reduced, so that but one dose of an hypnotic is necessary to carry them through the entire post-operative period.

4. *Post-operative Catheterization.* Since catheterization, even under the strictest aseptic precautions, is attended with the dangers of trauma to the urethra, infection of the bladder and even ascending infection of the urinary tract, the removal of this danger alone establishes the great value of the combined method of anesthesia in the operative treatment for hemorrhoids.

1945 SEVENTH AVE.

TREATMENT OF POST-OPERATIVE SHOCK.*

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The successful prevention and treatment of shock depend upon an accurate conception of its nature and causation. Numerous theories have been offered to explain the phenomena of shock, but when put to the clinical test they have all proved disappointing. Thus, the vasomotor center is not exhausted; the heart is not primarily involved; acapnia is not necessarily present; oligemia is not usually demonstrable; over-inhalation has not been proved; adrenal insufficiency is not generally admitted; the disappearance of the Nissl bodies from the cells of the cerebellum and the region of the fourth ventricle is not constant.

Despite the painstaking and brilliant investigations which have been made in the attempt to solve the problem, we know little or nothing about the nature of shock. We have learned, however, the direct exciting cause of shock. In the last analysis, shock is always due to afferent impulses—impulses which may arise at the periphery or within the central nervous system itself. It is upon this scant foundation that the treatment of shock must be built.

The prophylactic treatment has been so carefully perfected by Crile and has proved so successful when properly carried out, that it need not detain us. The one essential is the prevention of the development, or at least of the transmission, of noci impulses.

The treatment after shock has once developed is governed by the same principles. The wound or injury should be physiologically isolated from the central nervous system by means of cocaine, novocaine, or urea-quinine hydrochloride, and mental anxiety allayed by the use of morphine. The importance of thus staying the further progress of shock cannot be overemphasized.

The relation between afferent impulses and shock is so firmly established that no plan of treatment is worthy of consideration that does not include protection of the central nervous system from incoming stimuli. The further treatment of shock is more difficult, more unsatisfactory, more perplexing. The symptoms are familiar, but nothing is known of the pathological changes of which these symptoms are the clinical expression. We can

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treat the symptoms, but the utter uselessness of such therapy is only too often apparent.

Because the circulation is easily studied, undue prominence has been given to pulse rate and blood pressure. It is generally admitted, however, that neither the blood itself, nor the heart, nor the vasomotor center is the primary cause of shock. Indeed, the patient may be in profound shock and yet heart rate and blood pressure may be normal. Nevertheless, treatment, as ordinarily carried out, consists essentially of circulatory stimulation.

Since the treatment of shock is purely symptomatic, the measures employed should be at least harmless; that is, they should neither aggravate the symptoms nor intensify the degree of shock. This is the test to which the therapy of shock must be submitted. All measures that fail to meet this standard are certainly contraindicated.

The reflex stimulants form the first group of drugs to which I wish to call your attention. The group includes the "reflex stimulants" in the narrower sense, as well as alcohol, ether, and the numerous proprietary preparations which have alcohol or glycerine as solvents. Before absorption, any effect which they produce is of reflex origin. By their direct irritation of the nerve endings, with which they come into contact, they initiate a stream of centrifugal impulses; these reaching the central nervous system, produce changes identical with those arising in a wound or injury. Qualitatively, these impulses are as shock-producing as any other afferent impulses.

Camphor should also be included in this group. It, too, is a local irritant, and the effects which follow its injection are partly reflex and partly central in their origin. The stimulation of the central nervous system is subordinate to the local action, and camphor is as much contraindicated as any other irritating drug.

Not only are all shock-producing drugs contraindicated, but that group which facilitates the transmission of impulses within the central nervous system must also be avoided.

So much has been written about the danger of using strychnine in the treatment of shock that it is not necessary for me to condemn it further. I wish, however, to remind you of the way in which strychnine acts upon the central nervous system. It opens new paths along which the afferent impulse may travel freely up and down the cord, affecting an abnormally large number of cells. The response to a given stimulus is therefore stronger and more widespread than normal. A subminimal impulse becomes effective. In other words, it may

be said that strychnine increases the force of each afferent stimulus by raising the shock-value of the impulse and by lowering the shock resistance of the individual.

Caffeine, however, is said to have a proper place in the therapeutics of shock. When it is remembered that caffeine has the same effect upon the cord as strychnine, its position immediately becomes untenable. Stimulation of the psychic areas, an important function of caffeine, tends to arouse the patient and to add psychic shock to the existing surgical shock. It may be claimed that the circulatory stimulation outweighs the disadvantage consequent on stimulation of the central nervous system. Caffeine, however, has not proved a powerful circulatory stimulant, and no marked benefit can be expected from its administration. Large doses possess all the disadvantages of strychnine and probably exert, in addition, a depressant action upon the heart.

The use of hot black coffee in the form of an enema is so frequently recommended that an analysis of its action may prove of value. The effect is due partly to the caffeine; more important are the empyreumatic oils, the pint of water, and the heat. Any action of the aromatic oils will be the result of a reflex, a method of treatment that has already been condemned. The hot fluid, which is the only advantage possessed by coffee over strychnine, can be administered to much better purpose in the form of a hot saline irrigation.

In discussing the drugs which act directly upon the circulation, we may consider first those which lower blood pressure. These may be divided into the cardiac depressants and the arterial dilators.

Aconite and veratrum viride are the most important members of the first group. They lower blood pressure by slowing and depressing the heart. If shock were due to acceleration of the heart—as has been claimed—these drugs would be indicated, despite the fall in blood pressure which they produce. The acceleration of the heart, however, is the manifestation of the attempt on the part of the heart to maintain an efficient circulation, and any slowing thereof is reflected in a slowing of the circulation—a reaction which is most certainly undesirable.

The nitrites lower blood pressure by dilating the blood vessels. The most serious symptom of shock, from a prognostic point of view, is a low blood pressure, and any attempt to lower that blood pressure further regularly results in deepening the degree of shock. We conclude, then, that no drugs that lower pressure are called for.

Of the drugs which raise blood pressure, epi-

nephren, pituitrin, and possibly strophanthin, are the most important. The subcutaneous or intravenous injection of atropine is frequently followed by a rise in blood pressure, the extent of which varies directly with the tonus of the vagal center. Only when the tonus is such that the heart is beating slowly does atropine produce a considerable rise in blood pressure. The rise is secondary to the augmented output of the accelerated heart and not to vasomotor stimulation. In shock, vagal tonus is slight or absent. The heart has escaped from vagus control, and one neither expects nor finds a rise in pressure after atropine.

Clinically, epinephrin has proved to be the most efficient drug in combating the low blood pressure of shock. The method of administration is extremely important. Neither subcutaneous or intramuscular injection is followed by the slightest rise in pressure. Only when the drug is injected directly into a vein are the vessels constricted.

The injection of a few minims of epinephrin is followed by a very small, evanescent rise in pressure. In order to obtain a more marked and more prolonged effect, the drug must be given in conjunction with a saline infusion. The rise in blood pressure outlasts the infusion but a very few minutes. It is necessary, therefore, to be sparing both of the saline and of the epinephrin. The free use of the salt solution soon leads to hydremic plethora and the heart becomes embarrassed. If too much epinephrin is employed, the rise in blood pressure becomes excessive and the work of the heart is unnecessarily increased. Accordingly, the epinephrin-saline infusion is continued until blood pressure is approximately normal. The infusion is then interrupted, to be resumed when the blood pressure falls dangerously low.

In the laboratory, at least, pituitary extract has a distinct advantage over epinephrin. The rise in blood pressure which follows its intravenous injection is maintained for hours rather than minutes. Like epinephrin, the subcutaneous or intramuscular injection of pituitrin is not followed by any improvement in the circulation. This effect is produced only when the drug is given intravenously, and may be increased by the simultaneous administration of a saline infusion. The side effects on urinary secretion and on the intestine are independent of the effect on blood pressure.

Clinically, the drug has proved somewhat disappointing and is not employed so frequently as a few years ago.

The digitalis preparations when administered by mouth affect the circulation only after the elapse

of from twenty-four to forty-eight hours. This prolonged latent period precludes their oral administration in the treatment of shock.

None of the official or proprietary preparations is fit for intravenous injection. Hence, if a digitalis effect is desired, strophanthin should be employed. Administered in doses of not more than 1 mg. in twenty-four hours it produces within half an hour a considerable slowing and strengthening of the heart and a rise in blood pressure. This effect frequently persists for eighteen hours. The value of this drug as a circulatory stimulant has not been recognized by the surgeon.

Of the mechanical means of raising blood pressure, gravity is of the utmost importance. The head-down position assures a fair blood supply to the higher divisions of the central nervous system and materially assists the return of the blood to the right heart. The same advantages may be obtained by the use of pressure, particularly when applied to the limbs and abdomen.

The quantity of fluid within the blood vessels can be increased, temporarily at least, by a saline infusion. A far better method is to transfuse, because the rise in pressure is much longer maintained.

The betterment of the circulation which follows any of these procedure leads to improved nutrition of the central nervous system and all the other organs, and frequently assists in the recovery of the patient. Again I wish to emphasize that circulatory failure is only one of the symptoms of shock and is rarely the direct cause of death. Probably 90 per cent. of the cases die from respiratory paralysis.

Whether the respiratory failure is due to the asphyxia secondary to the low blood pressure, or whether it is due to the absence of the normal hormone, has not been determined. It is necessary, therefore, to maintain a fairly efficient circulation and to conserve or administer carbon dioxide during shock.

What drugs may be used to stimulate the respiratory center?

Measured by the standard already set, drug stimulation of the respiratory center is limited. It has already been shown that neither reflex stimulation nor caffeine nor strychnine may be employed. Atropine is probably the only drug which may be used. I venture to suggest that even this drug is contraindicated because further investigation will probably prove that its action on the central nervous system resembles closely that of strychnine or caffeine.

Surgical shock may be complicated by:

(1) Hemorrhage. The only modification of the treatment necessary is prompt restoration of the fluid lost, either by saline infusion or by a transfusion.

(2) Toxemia, particularly that caused by the anesthetic. Chloroform is a powerful circulatory depressant and renders the patient more susceptible to surgical, traumatic, and hemorrhagic shock.

There are two forms of chloroform death, depending upon the strength of the vapor inhaled. Concentrated mixtures of chloroform and air paralyze the heart and kill the patient before anesthesia is established. In these cases respiration continues after the heart has stopped.

Very dilute solutions of chloroform and air cause a progressive lowering of blood pressure and weakening of the heart from the moment their inhalation is begun. When death occurs under these conditions it is due to respiratory failure; the heart continuing to beat after breathing has ceased.

The first type of chloroform poisoning may be prevented by avoiding the use of a too concentrated anesthetic mixture. If the heart has stopped, artificial respiration should be at once instituted. The Sylvester method has the advantage that during the compression of the chest the heart is massaged and the chloroform-laden blood is expelled from its chambers.

Chemical stimulation of the heart is absolutely necessary. The surest method of bringing a drug into direct contact with the cardiac muscle is by perfusing it through the coronary arteries. Accordingly, an artery is exposed and a cannula is inserted pointing towards the heart. The saline infusion is then begun, and epinephrin is injected through the rubber tubing just above its connection with the arterial cannula. The epinephrin-saline infusion is thus passed through the coronary arteries; the closed aortic valves preventing its entrance into the cavity of the left ventricle. This method of cardiac resuscitation is successful in about 30 per cent. of the cases. The chief difficulty is in estimating the quantity of epinephrin that is to be used. If too much is injected, it causes a powerful constriction of the blood vessels and a tremendous rise in blood pressure. The heart, already weakened by the chloroform, contracts once or twice against this enormous resistance, then passes into fibrillation and permanent death.

When chloroform causes respiratory failure, artificial respiration is usually sufficient to revive completely the patient. If necessary, an intravenous

injection of epinephrin may be employed to support the heart.

Ether rarely causes circulatory depression. Death after ether is always due to paralysis of the respiratory center, and should never be permanent. The heart continues to beat after breathing has stopped and its death is due to asphyxiation. Artificial respiration and an intra-arterial infusion, such as was described under chloroform, will almost invariably revive such a heart.

SUMMARY.

The treatment of shock as usually carried out is empiric. A rational treatment must be established. It must be based upon what has actually been learned about the causes and nature of shock. Shock is directly due to afferent impulses. The rational treatment of shock must therefore be directed against the exciting cause. The rest of the treatment is purely symptomatic. It must not increase, directly or indirectly, the susceptibility to shock.

The rational treatment of shock comprises: Protection of the central nervous system from afferent impulses, by (a) physiological isolation of the wound; (b) allaying mental anxiety by means of morphine.

This shielding of the central nervous system, together with the head-down position and the application of external heat, constitutes the nucleus, if not the whole rational therapy, of shock. It assists nature by working with her, and interposes no obstacle to recovery. If applied early this treatment will prevent the development of shock; if carried out after shock is present, it will assist in the recovery. A transfusion is unquestionably the most promising method for supporting the circulation. If a donor is not at hand, an epinephrin-saline infusion may be given. Since neither of these measures attacks the exciting cause of shock, too much cannot be expected of them.

Carbon dioxide should be administered in the presence of a definite history of hyperpnoea.

Under no circumstances are reflex stimulants to be employed. Caffeine, strychnine, cardiac depressants, and the nitrites are absolutely contraindicated.

There is, I believe, a real danger in overdoing stimulation, so that we retard rather than assist the recovery of the patient. The only completely successful treatment of post-operative shock may be summed up in the word—*prophylaxis*.

COLUMBIA UNIVERSITY.

FRACTIONAL REBREATHING IN ANESTHESIA—ITS PHYSIOLOGIC BASIS, TECHNIC AND CONCLUSIONS.

By E. I. McKESSEON, M.D.,
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In a preliminary report attention was called to this method in 1911. Since that time I have used the method continuously, and all cases have been charted as to the amount of rebreathing, the systolic and diastolic blood pressures, pulse rate, respiration rate and volume, the percentages of gas and oxygen used, and the quantity of ether used, when the latter has been employed as a supplemental anesthetic. These determinations have been made prior to anesthetization in each case, and at five to ten-minute intervals, or oftener, in some cases, throughout the entire period of anesthesia.

HISTORICAL CONSIDERATIONS.

Since Priestly discovered nitrous oxid in 1772, it has been used to produce peculiar sensations and strange mental effects. For years after its discovery this property made it a popular means of entertainment quite similar to present day exhibitions of hypnotism. During these exhibitions on many occasions people fell and painlessly sustained injuries. As early as 1800 Sir Humphrey Davy suggested its use in surgery, but nothing was done clinically to clinch his opinion.

Henry Hill Hickman, of Ludlow, Shropshire, England, between 1820-28, set about to discover some means of relieving pain during his operations. Experimenting on animals, he first produced semi-asphyxia by excluding air (by rebreathing CO_2), and later by using N_2O with success. He was not able to interest his profession at home or in Paris, however, and died in 1829 without applying his discovery to the human subject.

Horace Wells, a dentist of Hartford, Conn., in July or August of 1840, in a conversation with Linus Brockett, M.D., said: "I believe a man may be made so drunk by this gas (nitrous oxid) or some similar agent, that dental or other operations may be performed upon him without any sensation of pain." Wells was already thinking about anesthesia, and when Prof. C. Q. Colton four years later gave an exhibition with nitrous oxid in Hartford on the evening of December 10, 1844, the occurrence of another accident, in which one of the subjects was painlessly injured, further substantiated the opinion of Wells, who was one of the spectators at the exhibition and had also taken the gas. The next morning Wells conversed with Prof. Colton upon the subject of painless injuries, of the

possibilities of nitrous oxid in dentistry, and suggested that Prof. Colton come to his office and administer nitrous oxid to him while he had an upper third molar extracted under its influence.

Accordingly the appointment was made. Dr. John M. Riggs was called to do the extraction, and quoting Dr. Riggs' own words: "Dr. Wells, after seating himself in the operating chair, took the bag and inhaled the gas, he threw back his head and I extracted the tooth. It was a large molar in the upper jaw, such as is sometimes called a 'wisdom tooth.' It required great force to extract it. Dr. Wells did not manifest any sensibility to pain. He remained under the influence of the gas for some time after, and immediately upon recovering from it he swung his arms and exclaimed: 'A new era in tooth pulling.' He remarked that he did not feel any pain from the operation."

Wells was so certain of the nature of his discovery and fearless in its application that he, Dr. Riggs and other dentists at once began using nitrous oxid in their practices, and even went so far as to set apart a day when teeth would be extracted without pain.

In an endeavor to bring his discovery of anesthesia to the notice of the medical profession at large, he went to Boston and gave a public demonstration on *one* patient. The result was unsatisfactory because the gas bag was removed before the patient was thoroughly under. "The patient howled somewhat during the operation, but on his return to consciousness, said he felt no pain whatever." Wells, however, was denounced as an impostor, although during this stay at Boston he successfully anesthetized a group of medical students for their own instruction.

The one case, usually referred to as a failure, especially by those who, a few years later, tried to rob Wells of the honor of having discovered anesthesia, was not in reality a failure, nor did it retard the use of gas, which was soon employed in many places for operations of various kinds.

It is noteworthy that Wells' apparatus consisted of only a large bag and a mouth tube to breathe through. The patient rested the bag of gas in his lap, took the tube into his mouth, and inhaled the gas while the nose was held with one hand. It is obvious, therefore, that the first application of gas as an anesthetic was by the rebreathing method since there were no check valves to prevent it.

Wells had considered ether as an anesthetic, but on account of its odor and the nausea it produced, which were well known from the "ether frolics," common in those days as a means of entertainment,

he preferred nitrous oxid, which in his opinion was more like air and safer.

WILLIAM T. G. MORTON, who had been a student of Wells, and for a short time also a partner in his office, 1846, or nearly two years after Wells' discovery, publicly demonstrated ether, and later attempted to appropriate the honor of having discovered anesthesia. Morton first sprinkled the ether on a handkerchief, but later it was placed in a flask having two openings to breathe through; one opening was placed to the patient's mouth by means of a tube, and the patient inhaled to and fro through the flask, picking up the ether vapor. In this way rebreathing was also early established in the administration of ether. But this apparatus had to be improved because of the inadequate supply, or concentration of ether vapor for some cases, especially the heavy breathers.

Next came the type of apparatus which was devised by Clover and variously modified and imitated by a host of others. It consisted essentially of Morton's flask, with the additional means of controlling the amount of air coming into contact with the ether, and also a bag to increase the rebreathing. This bag was the principal improvement, since it retarded the elimination of ether from the blood, thereby making etherization easier. This is known as the "closed method," while Morton's flask was a "semi-closed method," since the amount of rebreathing in the latter was partial and always constant, and depended upon the dead space in the flask and upper air passages.

The Clover method was used for years, but finally fell into disuse with most American surgeons, because of incompetent administrators. This simple but inaccurate apparatus required a high degree of skill for its proper management; as a result, patients were often allowed to breathe to and fro from the bag until they were quite asphyxiated and overcharged with ether and CO_2 before fresh air was administered.

Although many have held to the closed method, the so-called open method has largely displaced it in this country. The latter, in reality, is not open, but semi-open, since air is *not freely* accessible through the many layers of gauze or toweling ordinarily used. With some "open" masks and the usual amount of gauze, rebreathing is excessive, since 200 to 400 c.c. of *alveolar* gases are thus retained and rebreathed; a study of the symptoms alone shows it.

With ether we have had three eras. The first two have purposely employed rebreathing; the third, the open-method era unintentionally employed

considerable rebreathing; and it now appears that the fourth is beginning. The coming era will give us accuracy in dosage of ether vapor, accurate rebreathing, the return of apparatus for its administration, and more restrictions in its use.

When Wells chose nitrous oxid in preference to ether as his anesthetic agent he did not know that he had selected an agent which, to this day, remains the most difficult to administer; an agent requiring the most accurate mechanical control of the gases to produce uniformly good results. It was this fact which gave ether, and later chloroform, their opportunity to practically supplant N_2O in general surgery, and this retarded for years the perfecting details that we now recognize as imperative in perfect N_2O -O anesthesia. The professional anesthetist now taking his place in the operating room is mastering N_2O -O anesthesia and bringing it into general use.

In the '90s there was some discussion tending to show that rebreathing exhaled gases, especially CO_2 , was liable to poison the patient, when a considerable proportion of gas users adopted the valved inhalers which would not permit rebreathing. During the same period chloroform had gained supremacy over "closed ether," being administered by the open method—a fact which also may have influenced the two professions against rebreathing in nitrous oxid.

We must not pass the year 1868 without at least mentioning the fact that Andrews of Chicago demonstrated the value of oxygen with N_2O , the application of which, by others, has made major surgery uniformly practicable with N_2O anesthesia.

The first successful attempt to administer nitrous oxid and oxygen at ordinary atmospheric pressure by means of an apparatus capable of regulating the proportions of the two gases was made by Hillischer, of Vienna, and it was the report of his investigation that attracted Hewitt's attention to the subject. In 1886 this master administrator commenced a series of experimental administrations at the Dental Hospital in London, giving impartial attention to all known methods of nitrous oxid anesthesia, using it alone, concurrently with air, or in combination with oxygen, in varying percentages, and finally with *rebreathing of the gases*. These clinical researches resulted in the development of the Hewitt apparatus, which for years was the most efficient device obtainable for nitrous oxid oxygen anesthesia. At this time Hewitt succeeded in maintaining a non-asphyxial type of nitrous oxid-oxygen narcosis for periods of 35 minutes, for such operations as Syme's amputation, lithotripsy, re-

removal of the breast, excision of varicose veins, varicocele, resection of the patella, several intra-uterine operations, and numerous minor surgical operations and the *dressing of wounds and readjustment of splints*.

The first systematic endeavor to administer nitrous oxid and air for prolonged anesthesia was made by Bush, of Brooklyn, who employed an apparatus with a sliding valve, so arranged as to admit atmospheric air according to the requirements of the patient and the narcosis. Operations lasting upward of one hour were performed under the influence of the anesthesia thus produced, but the method could not compete with the perfected gas-oxygen technic, although it has a few advantages even at the present time.

In 1892, Clover renewed interest in prolonged nitrous oxid anesthesia by continuing the narcosis induced in the usual manner by passing the gas through a metal tube into the mouth. In 1898, Coleman revived the use of the nasal inhaler, which Patterson in 1899 modified and adapted to his improved apparatus. In 1902, Kilpatrick improved it by adding an expiratory valve, which could be thrown in or out of action as desired. In the same year Hillard used endo-pharyngeal nitrous oxid anesthesia by means of soft rubber tubes passed through the nares into the naso-pharynx. Teter has since improved the nasal technic by using oxygen and a pressure regulated expiratory valve.

PHYSIOLOGIC BASIS OF REBREATHING.

After years of work, physiologists generally agree that animals that have died in air-tight confinement in which oxygen was supplied and CO_2 removed, death was not due to poisoning from rebreathing exhaled gases, but to ammoniacal decomposition of urine and feces in the cage, and that there is no organic substance in exhaled gases, which is toxic. Herman, Haldane, and Smith have pointed out that CO_2 may reach a 4 per cent. concentration in the air before stimulating respiration. Hill and Flack found that CO_2 up to 35 per cent. in the air breathed stimulated respiration, while higher percentage tensions depressed it; that percentages up to 22 produced a rise in blood pressure, while greater percentages depressed it. They further stated that "the effects of CO_2 on the heart can always be quickly recovered from, even if the blood pressure has sunk to zero." When it is remembered that there is from 40 to 45 volumes per cent of CO_2 normally in the blood, such statements as the above are not startling, and CO_2 , except in fair concentration, cannot be regarded as poisonous.

Henderson, in 1908, began the publication of his

work on acapnia and shock. He brought forward experiments to support his contention that CO_2 in the blood regulates blood pressure and respiration, and that by rapid or deep respiration the CO_2 content of the blood is reduced, a condition which he termed "acapnia." He further contended that acapnia is the cause of surgical shock, and produced it in dogs by over-ventilating the animal's lungs and blood by means of a pump or bellows. He then successfully relieved the shock and apnea by administering oxygen to sustain the heart until sufficient CO_2 had accumulated in the blood to reestablish respiration. This required several minutes. Respirations were more quickly restored when CO_2 was administered. His conclusions favored the use of rebreathing in anesthesia as a means of avoiding over-ventilation and shock.

Gatch, then of Johns Hopkins, was among the first to put Henderson's theories of acapnia and hypercapnia to the crucial test of clinical application, and at the sixty-second Annual Session of the American Medical Association, at Los Angeles, reported on a series of 2,500 nitrous oxid-oxygen and nitrous oxid-oxygen-ether anesthetics, in Halstead's clinic, by a method of rebreathing, using an apparatus which he had personally devised for accomplishing the technic. The apparatus was simplicity itself. Gatch had the patient exhaust the residual air in the lungs by breathing a mixture of nitrous oxid and oxygen through valves. The bag was then refilled and rebreathing of nitrous oxid with an unmeasured quantity of oxygen was allowed for from five to eight minutes, when the bag was emptied breath by breath through the expiratory valve, and the same process was repeated indefinitely. The amount of oxygen supplied was gauged entirely by the patient's apparent requirements, his condition and the necessary depth of the narcosis. For purposes of relaxation ether was added by dropping it upon drip plates, where the ether, heated by rebreathing, quickly evaporated, and was rapidly absorbed into the blood because of the increased pulmonary ventilation.

This technic of rebreathing, while efficient in the hands of an exceptionally skilled administrator, is inaccurate for routine purposes, and prone to produce hypercapnia, followed by an increase of blood pressure, slowing of the heart and nausea, on the one hand; or acapnia, if the bag is filled too frequently, on the other.

A great impetus to the rebreathing method, however, occurred and anesthetists generally began using it again.

Until 1910, rebreathing had always been accom-

plished as Wells, Clover, Hewitt, or Gatch had practiced it—by allowing the patient to breathe to and fro for a certain time into a bag of anesthetic vapors which was larger than the patient's tidal respiration. This is *total rebreathing*, since the *whole* breath is stored and rebreathed.

FRACTIONAL REBREATHING.

In 1910, I devised the *fractional method of rebreathing* and constructed a special bag for that purpose. The bag is cylindrical, of thin rubber, and attached to a gas tight ring which slips over a cylindrical tube with a perforated bottom. By moving the ring and bag up or down, the capacity of the bag is decreased and increased. The tube being graduated in 100 c.c. divisions, the capacity of the bag is known at all times and may be accurately adjusted as desired. I have termed this the "frac-



Fig. 1. McKesson Adjustable Rebreathing Bag for the Fractional Method.

tional rebreathing bag," since in use, *only a portion* of each breath is retained for rebreathing. The bag is attached to the gas-oxygen or other apparatus between the supply bags and the inhaler so that on exhalation the rebreathing bag is first filled and the latter part of exhalation escapes from the exhaling valve on the face mask. On inhalation the bag is first emptied and the remainder of the inhalation comes from the fresh gases in the supply bag. In this way the action is automatic, accurate, and free from danger of asphyxia, from lack of control or experience—always a danger when total rebreathing is used.

As a means of determining *how much* of each breath should be retained and rebreathed the bag is used to *measure* the *tidal* respiratory capacity of the patient from time to time during anesthesia. This is accomplished by moving the ring and bag down until the bag is just large enough to be filled

and emptied with each breath. The graduation on the tube in cubic centimeters represents the tidal volume.

PHYSIOLOGIC BASIS OF THE FRACTIONAL METHOD.

A brief review of some facts in the physiology of respiration will show the importance of this method.

The average lung capacity in forced inhalation is about 3,700 c.c., but the amount of air inhaled and exhaled at an ordinary breath is only about 500 c.c., called the tidal volume.

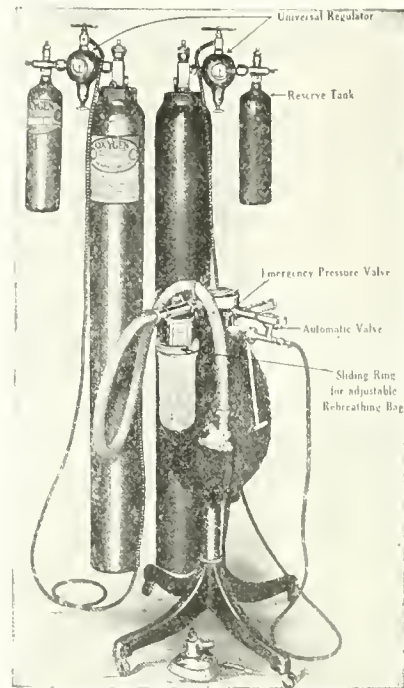


Fig. 2. A Rebreathing Bag Adapted to the McKesson Apparatus.

The tidal respiration may be divided into two portions: the first, which fills the tubes and passages leading to the alveoli; and the second, which *occupies* the smaller bronchioles and alveoli where the exchange of gases actually takes place.

The quantity normally contained in the upper air passages and bronchial tree, in which there is *no* CO_2 , is 140 c.c., while the second, or alveolar portion, amounts to 360 c.c. and represents the volume of gases actually engaged in respiration.

In selecting the part of the exhalation to be rebreathed, I constructed the apparatus to retain the first portion in order to save the 140 c.c. of unused gases. Since this 140 c.c. contains no carbon dioxide it could be of no other use than the saving of approximately one-fourth of the gases consumed by the patient, and, therefore, represents economy. Moreover, this 140 c.c. has lost none of its nitrous oxid or oxygen to the blood and, therefore, should

not be wasted. If this were all that one would wish to be rebreathed, a 140 c.c. bag to catch these gases only would be simplicity itself. But we must usually be able to save more than 140 c.c. of each exhalation if we are to prevent over-ventilation. The amount actually used for rebreathing must be adjustable and based upon the ventilation of the lungs.

What is the normal ventilation of a sleeping adult? It is the product of the rate of respiration by the volume of gases taken at a breath. This normally amounts to from 7,000 c.c. to 8,000 c.c. per minute for 15 respirations $\times$ 500 c.c. = 7,500 c.c. per minute. But the patient in anesthesia often breathes rapidly, 30 times per minute of 500 c.c. or 15,000 c.c. per minute. In other words, he has doubled his ventilation, or over-ventilates. Now, to reduce the ventilation of this patient to normal by means of fractional rebreathing, the bag is set to catch 250 c.c.; half of each breath to be taken at the following inhalation together with fresh gases, to the amount of 250 c.c. At each breath this accurate selection is automatically accomplished, and so long as the respiratory rate or volume does not change, no further adjustment is required, and the patient actually exhales but 7,500 c.c. per minute, although the respiratory movements would double this amount if half of each breath were not rebreathed.

Rapid breathing in anesthesia, especially* with N_2O , is probably due to restricting oxygen in the nerve cell to amounts capable of supporting life functions only. This oxygen restriction sets up a protective train of impulses resulting in rapid respirations, for it is common knowledge among N_2O -O anesthetists that a rich oxygen mixture for two or three breaths will invariably slow, and sometimes even stop, respiratory efforts for several seconds, but as the surplus of oxygen is consumed, the patient soon resumes rapid respiration. With ether, the oxygen restriction is probably of a chemical nature.

The rate of respiration in N_2O -O anesthesia depends largely upon the oxygen content of the mixture administered, increasing as the oxygen is decreased until such a point is reached that anoxemia begins to produce convulsive movements.

These rapid respirations, resulting in over-ventilation, eliminates more CO_2 from the blood than normal, which in some patients causes a decreased volume of respiration, thus partially correcting the over-ventilation. In the majority of patients, however, associated with this rapid respiration, other symptoms indicative of shock appear, such as increasing pulse rate, weakened heart contractions, as

shown by the decreased pulse pressures, as well as decreased systolic and diastolic blood pressures.

While over-ventilation is only one among the causes of surgical shock and not even as important as trauma, it is almost invariably associated with shock from any cause and may always be a contributing factor when present. It is, therefore, of importance that this cause be carefully eliminated in each case.

There are variations in the production and elimination of CO_2 by the body, notably in the variable amount of muscular contraction, food taken, etc.; but under the conditions usually encountered on the operating table with the patient properly prepared for operation, these variations are not so wide.

In clinical practice, therefore, we may prevent over-ventilation by allowing the patient to exhale between 7,000 and 8,000 c.c. of gases from the apparatus per minute, the normal for sleeping conditions. Thus the elimination of an excessive amount CO_2 , and in so far as this augments shock from any cause, it may be prevented.

TECHNIC.

The rate of respiration is determined, then the tidal volume is obtained by setting the rebreathing bag where it is just large enough to hold an exhalation and to accommodate inhalation. The volume of the bag now represents the tidal respiration and the position of the ring on the graduations indicates the volume in c.c. Then the bag is decreased in capacity by elevating the ring as much as it is desired the patient shall obtain of fresh gases, and also exhale alveolar gases at each breath. The balance is to be rebreathed.

Respiration rate.	Fresh gas to be inhaled and Alveolar gases to be exhaled.		Normal ventilation.
15	X	500 c.c.	7500 c.c.
20	X	375 c.c.	7500 c.c.
25	X	300 c.c.	7500 c.c.
30	X	250 c.c.	7500 c.c.
35	X	210 c.c.	7500 c.c.
40	X	185 c.c.	7500 c.c.
45	X	160 c.c.	7500 c.c.
50	X	150 c.c.	7500 c.c.

Referring to the table, suppose the patient breathes 25 times per minute, and that the tidal volume is found to be 550 c.c. at a breath; then the amount of fresh gases to be taken and alveolar gases to be eliminated at each breath to maintain a normal ventilation would be 300 c.c. The bag is, therefore, decreased by raising the ring 300 c.c. from 550 c.c.; then the amount to be rebreathed would be the amount above the ring, or 250 c.c. With each breath the patient thus inhales 250 c.c. from, and empties the rebreathing bag, while the remainder of the inhalation, 300 c.c., comes from the supply bags filled with fresh gases. On exhal-

ing, the rebreathing bag catches the first 250 c.c. to leave the air passages, but as soon as it is filled the latter portion of exhalation, or the following 300 c.c. escapes automatically from the valve at the inhaler, and is thus eliminated from the apparatus. To repeat, the fractional method permits us to accurately limit the amount of gases actually exhaled per minute to the normal sleeping elimination of 7,000 c.c. to 8,000 c.c.

Since using the fractional method of rebreathing, I have found that with a tidal volume of less than 300 c.c., the resulting anesthesia under nitrous oxid-oxygen is often unsatisfactory, doubtless due to an inadequate exposure of the gases in the alveoli for absorption. This fact may account for the efforts made by earlier investigators to improve nitrous oxid-oxygen anesthesia by its administration under increased atmospheric pressure; and it explains Gwathmey's conclusion that: "Five m.m. of mercury pressure in the rebreathing bag have been found a very great help in those subjects usually considered unsuitable for nitrous oxid-oxygen." The increased pressure under these circumstances restricts ventilation in the alveoli and through the CO_2 retention, stimulates larger respiration, which increases the absorption of gases and thus deepens anesthesia. It is not probable that such a small increase in the gaseous pressure would in itself materially increase absorption.

When an adult patient has a tidal volume of 300 c. c. or less, the rebreathing bag should be set so that a considerable portion of this is rebreathed for a minute or so until enough CO_2 is thus retained to increase the *depth* of respiration to about the normal, or 500 c. c. When the normal volume is secured, the rebreathing bag is readjusted on the basis of the rate of respiration previously described. Generally, the volume may not be increased *above* the normal without stimulating the rate of respiration, which is usually undesirable. The increased volume of respiration exposes more gas-oxygen to the blood for absorption, and a deeper anesthesia is obtained without changing the mixture of gases. Within certain limits rebreathing may be used to stimulate the *depth* of respiration, while the *rate* may be varied somewhat by the proportion of oxygen in the mixture. The latter, however, is less susceptible of manipulation.

An exceptionally valuable feature of the fractional rebreathing device is that it automatically selects those gases coming from the upper air passages to be retained for rebreathing and eliminates from the apparatus most of the latter portion of exhalation, coming from the deeper and alveolar

portions of the lungs, which contains 6 per cent. of carbon dioxide and is poor in anesthetic properties.

That rebreathing will favorably influence the precarious condition of hazardous risks has been abundantly proven in Gatch's experience and my own.

The manner in which rebreathing may be used to influence the condition of a patient is shown in the accompanying chart of one of my cases.

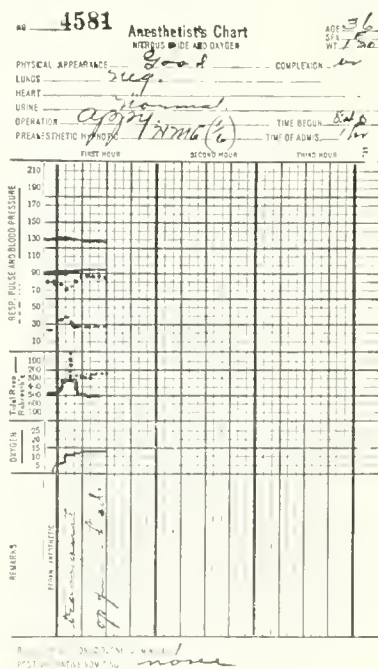


Fig. 3. Illustrative Chart.

CASE I. Shortly after beginning this anesthesia for an appendectomy, the tidal respiration was but 300 c.c. In the second five-minute interval, rebreathing was set for 300 c.c. as shown by the dotted line in the middle section of the chart. In two or three minutes the tidal respiration began to increase until it reached 500 c.c., when the rebreathing bag was set for 250 c.c., as the rate of respiration was 30 per minute, indicated by the broken line. This chart also illustrates the slowing of the respiratory rate when the oxygen percentage is increased; also, the influence of rebreathing in maintaining blood pressure, and thereby acting as a prophylactic measure against the insidious onset of shock.

The occasional necessity of administering ether with nitrous oxid and oxygen usually caused by faulty preparation of the patient, mistakes of the anesthetist, or roughness by the surgeon, does not interfere with the routine use of fractional rebreathing. In fact, an extraordinarily safe and efficient nitrous oxid-oxygen anesthesia with fractional rebreathing may be readily maintained with an exceedingly small amount of ether.

Excessive ether percentages which were a constant factor in the older methods of etherization by closed cones with rebreathing have been shown by Ladd and Osgood to have been responsible for the occurrence of acetoneuria in 88 per cent. of pa-

tients thus anesthetized. With the open drop method of etherization this percentage falls to 25. In nitrous oxid-oxygen-ether anesthesia with fractional rebreathing of post-anesthetic acidosis is negligible.

The following case from my practice illustrates the value of rebreathing and oxygen in collapse:

CASE 2. Following an abdominal operation of ordinary severity, the patient, a man of moderate build, in the twenties, who had been anesthetized with ether, apparently "fainted." The patient had been in bed about one hour, had regained consciousness and seemed so well that his relatives had left the hospital half an hour before the incident occurred.

The nurses failed to revive him by their usual treatment for fainting. The pupils were widely dilated, pulse imperceptible, pallor and perspiration marked, with no effort at respiration. They began artificial respiration and sent word to the operating room. It was ten minutes before I was able to leave the patient I was then anesthetizing, but shortly after that found the patient as above described, but cyanosed slightly, still making no voluntary respiratory efforts.

I then inflated the lungs with pure oxygen three times in about ten seconds to make sure that the supply of oxygen was adequate to support the heart. I then held the mask against the face and waited half a minute by the watch. There was no respiratory effort, but the cyanosis faded slightly. His lungs were again inflated with oxygen and another half-minute wait still failed to develop the slightest respiratory effort. And so the O₂ inflations were continued as described for six and a half minutes before feeble respiratory efforts began. In the meantime the pupils gradually began to contract, although still large, when respirations resumed. The pulse was still imperceptible at the wrist.

During the next fifteen minutes he quite rapidly increased the volume of respiration under the stimulating influence of rebreathing. The rebreathing bag was kept within 50 c.c. of his tidal volume, so that but a small portion of each breath escaped. When the pupils were normal, the pulse strong, and the patient was again rational, the method was discontinued. The patient made an uneventful recovery after this collapse.

During the period while we were waiting for respiration to be started by CO₂ in the blood, oxygen was administered to save the heart from anoxemia, taking care that the ventilation would be well below normal, and thus allow CO₂ to accumulate. The oxygen by the rebreathing method, I believe, saved the patient. If a high percentage of CO₂ had been thrown into the lungs and circulation, would it have started respiration as it did when the heart was sustained while CO₂ gradually accumulated in the blood? I do not know. It might quite easily overcome the tendency to respiration if administered in too strong concentration. How strong should CO₂ have been if it had been used? Under the conditions of the circulation I believe it quite impossible to judge. I prefer rebreathing and pure oxygen, which has also given me good results in several illuminating-gas asphyxias. In most of these latter cases, breathing was reestablished within ten minutes, and if the case was seen early, complete recovery followed in five to thirty minutes.

Rebreathing during the administration of nitrous oxid-oxygen will not only control the tendency of preliminary alkaloidal medication to decrease the rate and the volume of pulmonary ventilation, but will also, in association with over-ventilation with oxygen and carbon dioxid, combat the effect of morphin in preventing the elimination of ether from the system, if ether is used.

In conclusion, it may be stated that rebreathing

is a perfecting detail in the administrative technic of nitrous oxid-oxygen anesthesia, and that the *fractional method of rebreathing* made possible by the fractional rebreathing bag:

(1) Affords a practical means of measuring the tidal respiration.

(2) Selects automatically those gases coming from the upper air passages to be retained for rebreathing, and eliminates from the apparatus the latter portion of the exhalation coming from the alveolar portion of the lungs, which contains 6 per cent. carbon dioxid, and is poor in anesthetic properties.

(3) Controls the tension and elimination of concomitant etherization when employed.

(4) Prevents the rapid breather from using more gas, per minute, than he would use of air, if normally asleep.

(5) Makes the light breather increase the depth or volume of respiration, thus securing a better absorption of the anesthetic and a more satisfactory plane of narcosis.

(6) Reduces gas consumption to accuracy, and to an economic basis, which puts the technic within reach of all.

2233 ASHLAND AVENUE.

FEATURES IN THE APRIL SUPPLEMENT

OIL-ETHER COLONIC ANESTHESIA,
THE LATEST TECHNIC.

JAMES T. GWATHMEY, M.D.,
New York City.

PROCEEDINGS OF THE AMERICAN
ASSOCIATION OF ANESTHETISTS.

MEDICO-LEGAL ASPECTS OF ANES-
THESIA AND ANALGESIA.

(Concluded)

At the time of going to press, the SUPPLEMENT is in receipt of a communication that it has been made the Official Organ of the PROVIDENCE (R. I.) SOCIETY OF ANESTHETISTS.

Editorial arrangements are in progress to secure a number of articles from well-known authorities on the HISTORICAL EVOLUTION OF ANESTHESIA AND ANALGESIA. These articles will be based on original researches and documents, and will serve to correct many errors that have become traditional, on account of constant repetition, without any warrant of fact.

American Journal of Surgery

QUARTERLY SUPPLEMENT of ANESTHESIA and ANALGESIA

✪ Surgery Publishing Co. ✪

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F. HOFFER McMECHAN, A.M., M.D., Editor
Cincinnati, Ohio, U.S.A.

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"Even as a surgeon minding off to cut
Some careless limb, before in use he puts
His violent engines in the victim's member,
Bringeth his patient in a senseless slumber,
And griefless then, guided by use and art,
To save the whole, saws off the infested part."
Dubartas, 1502.

WORTHY OF HIS HIRE.

While the Committee of the Ohio State Medical Association has found that the awards paid to physicians and surgeons by the Ohio Industrial Commission, under the provisions of the Workmen's Compensation Law, are higher than those scheduled in New York or any other state, there is still room for improvement, notably in respect to the fee paid the anesthetist.

The Ohio Industrial Commission has arbitrarily fixed the anesthetist's fee at five dollars (\$5.00) irrespective of the inherent hazard of the case, the time and skill of the administrator and the method of anesthesia involved.

It is conceivable that a fee of five dollars may be a remuneration of sorts for local analgesia in the operative procedures of minor surgery, or a brief ether *rausch*, but when life hangs by a thread, and the anesthetist is called upon to prevent the occurrence of an operative death, involving an award of several thousand dollars, the five dollar fee is ridiculously inadequate in comparison with the importance and value of the services rendered.

Moreover, such an arbitrary, minimal fee precludes the use of nitrous oxid-oxygen anesthesia for extra hazardous risks, as the anesthetist would have to furnish the apparatus and gases required and do the work at a personal pecuniary loss. Hos-

pitals cannot and will not stand for this additional drain out of the five dollar fee allowed for operating room expenses.

The Ohio Industrial Commission is to be commended for promulgating the following rule:

"Fees covering services rendered by interns connected with a hospital shall not be paid from the state insurance fund."

This regulation not only saves the victim of an accidental injury from being anesthetized by an incompetent tyro, but reserves the work for the expert to whom it rightfully belongs.

The preceding rule is further emphasized in the following regulation:

"Fees covering services rendered by an assistant or an anesthetist shall not be paid from the fund unless such services are performed by a physician, and a separate fee bill covering such services presented by him. The necessity for the services of a consultant, assistant or anesthetist must be clearly apparent from the nature and extent of the injury before fees for such services shall be approved for payment from the state insurance fund."

This regulation effectively disposes of the nurse anesthetist in workmen's compensation cases, and the separate fee bill prevents the penurious surgeon from now treating the anesthetist as a charitable adjunct of the operating room staff. Those surgeons who, through a mistaken sense of economy, persist in having their anesthetics administered by others than licensed practitioners, would do well to reflect on the decision of the Supreme Court of the State of Louisiana in the case of *Nations vs. Ludington, Wells & Van Shaick Lumber Co.*, in which it was held that employing a non-medical anesthetist, however experienced, with no emergency existing, constituted negligence, and the damages awarded by the trial court to the plaintiff were increased to \$10,000.

Be that as it may, if the anesthetist is at all worthy of his hire, it would seem that the question of the anesthetist's fee under the provisions of recently enacted Workmen's Compensation Laws is a matter for the immediate attention of the American Association and New York Society of Anesthetists.

The New York Society of Anesthetists is already displaying commendable activity in the matter and at the November meeting of the organization a legislative committee of three members was appointed to investigate the question and report on a solution for the problems involved.—F. H. M.

THE AMERICAN ASSOCIATION OF ANESTHETISTS WILL HOLD ITS THIRD ANNUAL MEETING DURING THE PANAMA-PACIFIC EXPOSITION, AT SAN FRANCISCO, JUNE 19, 1915.

Medico-Legal Aspects of Anesthesia and Analgesia.

Editor's Note.—Periodically the Supplement will review American and Continental Court decisions involving the relations of Anesthetists and Surgeons to Anesthesia, Analgesia and the Law.

SURGEON NOT LIABLE FOR DEATH DUE TO ANESTHETIC ADMINISTERED BY MEDICAL STUDENT.

The deceased in this suit of *Levy (Administrator) vs. Vaughan*, was an over-weight hazardous risk, who was anesthetized by a medical student, who, while he had witnessed anesthetics administered in a large number of cases, had actually administered ether, before, in but eight or ten cases. The open-drop method with an Esmarch mask was the technic employed. The induction of anesthesia was attempted in the anesthetic room, under the general supervision of two house-physicians, who were in and out of the room during the 35 minutes required to get the patient under the influence of the anesthetic; about 3 ounces of ether being used. No complications presented until after the patient had been lifted on the operating table, when he was noticed to be cyanotic. The defendant felt the patient's pulse and immediately instituted artificial respiration, which proved temporarily beneficial, and the patient was returned to the ward, unoperated. Cyanosis persisted and, despite the use of resuscitative measures, the patient succumbed. Autopsy revealed fatty degeneration of the heart.

The Court of Appeals of the District of Columbia held that a verdict for the defendant had been properly directed, and affirmed judgment with costs. The court held that there was no evidence whatever of negligence, either in the preliminary examination of the patient or in the administration of the ether, by a student of the description given; as the evidence in behalf of the plaintiff showed that two experienced house-physicians were present, generally, during the induction of narcosis, in a supervisory capacity. That they were employed by the hospital and had not been provided by the defendant, was wholly immaterial, as was the fact that these interns were licensees of a state other than the District of Columbia. They were not practicing medicine in the District, but were employed in the hospital and had been shown to be competent.

DEATH FROM A NON-ABORTIVE ANESTHETIC.

In *State of Ohio vs. Tippie*, the Supreme Court of Ohio held that:

"Whoever, with the intent to procure the miscarriage of a woman by the use of an instrument or other means, administers to her a non-abortion drug as an anesthetic preparatory to the use of such instrument or other means of procuring an abortion, and the woman dies in consequence of the administering of such drug before the use of instruments or other means by such person to procure such miscarriage, and it does not appear that such contemplated miscarriage is necessary to preserve her life, or that the procuring of such miscarriage was advised by two physicians to be necessary for that purpose, is guilty of a violation of the provisions of Section 12412, General Code.

"Under such circumstances every act done and performed in furtherance of such unlawful purpose is an integral part of the whole unlawful transaction; and the fact that death ensues before the final act in the contemplated crime can be accomplished, is not a defense to an indictment charging a violation of this section.

"If it appear that a non-abortion drug is administered to a woman as an anesthetic to enable a duly authorized and practicing physician fully and carefully to examine into the woman's actual condition for the purpose of determining if it be necessary to produce a miscarriage in order to save her life, and the woman dies from the effect of the drug so administered, and no miscarriage is performed, nor intended to be performed unless the examination discloses that it is necessary to preserve the woman's life, no offense has been committed within the provisions of Section 12412, General Code.

"Evidence tending to show that no secrecy is maintained in the transaction, that a second physician is called in to administer the anesthetic, that while the woman is in a state of anesthesia the attending physician makes an examination for the purpose of determining whether the fetus is alive or dead, and upon such examination does determine that the fetus is still alive and that it is not necessary to procure a miscarriage in order to preserve the woman's life, and having so determined, makes no use of any instrument or other means to procure a miscarriage, but immediately desists from further efforts in that direction, and directs that the woman be restored to consciousness, is proper evidence to be admitted for the purpose of showing the absence of criminal intent in administering the anesthetic." (105 N. E. R. 75.)

LIABILITY OF EMPLOYER FOR DEATH OF EMPLOYEE UNDER OPERATION, WHEN LAYMAN ADMINISTERS THE ANES- THETIC.

In the case of *Nations vs. Ludington, Wells & Van Schaick Lumber Co.*, the patient, a laborer, died from the effects of the anesthetic before the operation was begun. The Supreme (Appellate) Court of the State of Louisiana held that employing a non-medical anesthetist, with no emergency existing, constituted negligence, and increased the damages, awarded by the trial court to the plaintiff, to \$10,000. The Supreme Court was emphatic in its declaration that in the case adjudicated, one contemplating minor surgery only, a physician should have been employed to administer the anesthetic, although the officiating anesthetist was experienced in this line of work, and administered the anesthetic in the presence and under the direction of the surgeon. (*Medical Record*, February 28, 1914.)

(To be continued.)

Book Reviews

A carefully selected library is essential to a thorough knowledge of the science and practice of a specialty.

Local Anesthesia. By CARROLL W. ALLEN, M.D., F.A.C.S. Instructor in Clinical Surgery at Tulane University of Louisiana. With an introduction by RUDOLPH MATAS, M.D., F.A.C.S., Professor of Surgery at Tulane University. Octavo of 625 pages, with 255 illustrations. W. B. SAUNDERS, Publishers, Philadelphia, 1914. Price, cloth, \$6.00.

In the revival of interest in general anesthesia and in local and regional analgesia, the tide of contemporaneous literature has swung from the continent to America.

Allen's volume, just off the press, is a complete and individual exposition of the various phases of local and regional analgesia. The historical evolution, principles, physiology, toxicology and technic of the subject are exhaustively covered and handled in a masterly manner. To enable the reader to secure a clearer insight into the causality of pain, a chapter is devoted to the nerves of sensation, their areas of distribution and association with the sympathetic system. Valuable advice is suggested regarding the psychic control of pain.

The principles of osmosis and diffusion, of various analgesics in combination and solution, on which the effectiveness of local and regional analgesia depend, are adequately considered and explained. Especial attention is devoted to cocaine and novocain, their action on the nervous system, the control of their toxicity and the value of adrenalin as an adjuvant. Also the peculiar obtunding effects of quinine and area, the magnesium salts and potassium sulphate are dilated upon.

Perhaps the most valuable feature of this volume is the minute detail with which the technics for spinal and epidural analgesia, paravertebral, parasacral, intrarterial, and intravenous anesthesia are described. These technics are amplified by numerous illustrations of exceptional merit in explaining difficult injections, and illuminating routine procedures.

Crile's latest accomplishments in anoci-association and

his method of adrenalin-saline transfusion are included as valuable aids in obtunding sensitive tissues and operative areas, and in preventing the occurrence of shock or in treating the condition once it has supervened.

The scope of Allen's book can only be fully appreciated when it is realized that he has detailed and illustrated all the various methods of local and regional analgesia as they apply to rectal, genito-urinary and gynecological surgery and to operative procedures upon the head, eye, ear, nose and throat as well as the extremities.

Even the subject of dental anesthesia is exhaustively considered.

While Allen has scoured the world's literature to encompass his subject, his volume emphasizes the value of those methods and details of technic, which from personal experience he has found to be the easiest and most efficient.

Local Anesthesia: Its Scientific Basis and Practical Use. By PROF. DR. HEINRICH BRAUN, Chief-of-Staff and Director of the Royal Hospital at Zwickau, Germany. Translated and edited by PERCY SHIELDS, M.D., A.C.S., Cincinnati, O., from the *Third German edition*, with 215 illustrations in black and colors. Octavo; 399 pages. Price, \$4.25. LEA & FEBIGER, Philadelphia, 1914.

Attention has already been drawn to the fact that the American edition of this work cost the translator his life; but it was worth the effort and it fulfills in a most efficient manner Dr. Shields' purpose, as expressed in the preface, written just before his untimely death:

"My object in placing Braun's work at the command of the English speaking surgical profession is to systematize the vague, erratic and unsatisfactory efforts which have been made in this field for many years, by offering a logical procedure, based upon scientific facts, and having an exact and undeviating technic."

This volume of Braun's may be truly termed a classic, and it stands as another monumental achievement of a medical genius' infinite capacity for taking pains. This third edition records not only a widespread popularity for the book itself, but an intrinsic development of the subject that has put analgesia on a secure and scientific basis, and rendered it adaptable to practically every known operation of surgery and its co-related specialties.

While Braun has had exceptional opportunities for developing the scope of local analgesia, both in general surgery and the specialties, he has not hesitated to incorporate the best work of the master-minds of both continents on analgesia, and he graciously acknowledges an especial indebtedness to the cooperation of Prof. Schwarz and Dr. Viereck.

Braun's review of the historical evolution of analgesia up to the discovery of cocaine is, to say the least, as interesting as it is exhaustive. His consideration of the osmotic tension of watery solutions and tumefaction and dehydration analgesia lays a basic foundation of physiological principles for the technics of infiltration and conduction anesthesia.

After extensive experiments with all known analgesic agents, Braun now utilizes, almost exclusively, novocain amplified by suprarenin. Hertzler's and Crile's notable successes with quinine and urea hydrochloride as an important adjunct to local analgesia seem entirely to have escaped Braun's observation.

Braun describes in detail not only the many novelties of his instrumentarium and the routine percentage solutions of the analgesic agents, but also gives the minutest directions regarding the general technic of infiltration and conduction analgesia, in respect to cutaneous cataphoretic, subcutaneous, peri, endoneural, lumbar, sacral, epidural, paravertebral, venous and arterial anesthesia.

The latter half of the book is devoted to the practical application of the technics of infiltration and conduction anesthesia to every conceivable sort of operative procedure. Readers of the previous German editions will be surprised by the number of new illustrations that have been added. They are especially striking because the photographs were taken during the course of actual operations, and the absence of any expression of pain on the faces of the pa-

tients is a remarkable advertisement of the absolute efficiency of the analgesic methods described.

Anesthesia and Analgesia. By JOHN DESMOND MORTIMER, M.B. (Lond.), F.R.C.S. (Eng.) *First edition*, 276 pages; 29 illustrations. WILLIAM WOOD & Co., New York, 1914. Price, \$2.00.

This volume on anesthesia and analgesia has been written, not so much from the point of view of the specialist, as that of the general practitioner and surgeon. Much of the routine matter usually included in text-books on anesthesia has been omitted, but on the contrary such important subjects as the preparation and after treatment of the patient, the selection of the anesthetic, the difficulties peculiar to certain operations, and the relative advantages of anesthesia and analgesia have been fully considered.

The chapter on the anesthetist's equipment, and his preparedness for such accessory operations as laryngotomy, tracheotomy, saline transfusion, lavage of the stomach, and measures for artificial respiration, is admirably conceived and replete with valuable suggestions.

Likewise the chapters devoted to the selection of the anesthetic, in reference to the patient and contemplated operative procedure; posture during anesthesia, and teamwork between surgeon and anesthetist are pregnant with practical information.

In no other volume on the subject is there such a masterly exposition of reflexes under anesthesia, and how they may be controlled by a mutual understanding between the operator and the anesthetist.

The tyro is told how to meet the difficulties, dangers and emergencies arising under anesthesia, and the expert may learn some useful practices from Mortimer's postanesthetic regimen.

While the routine procedures of spinal and local analgesia are succinctly considered, no effort has been made to compete with the more extensive monographs on these subjects. The book closes with a very interesting and instructive chapter on the medico-legal position of the anesthetist.

The routine observance of Mortimer's invaluable suggestions in his practical manual will go far in enabling the anesthetist to establish cordial relations between his patients, his operating surgeons and himself.

Index and Abstracts

A Résumé of the International Current Literature of Anesthesia and Analgesia.

EDITOR'S NOTE: *Authors of pertinent articles, who desire to have them indexed and abstracted, are cordially invited to send copies of the journals containing their contributions, direct to the editor, immediately on publication. Also the receipt of reprints for filing and reference will be duly appreciated.*

ACETONURIA FOLLOWING SPINAL ANESTHESIA. G. Gellhorn, St. Louis. *Zentralblatt für Chirurgie*, August 29, 1914.

ADRENALIN-COCAIN SURFACE ANESTHESIA. R. S. Cauthen, Charlotte, N. C. *Southern Medical Journal*, October, 1914.

ANESTHESIA, PHASES OF. J. A. Kirk, Louisville. *Kentucky Medical Journal*, August 15, 1914.

ANESTHESIA, PROGRESS IN GENERAL INHALATION. D. Kulenkamp. *Deutsche medizinische Wochenschrift*, September 7, 1914.

ANESTHETIC, CHOICE OF, IN OPERATING FOR ABSCESS OF THE LUNG. F. T. Murphy, St. Louis. *Annals of Surgery*, July, 1914.

ANESTHETIC POWDER, DUSTING WOUNDS WITH, BEFORE SUTURING. G. Hotz. *Muenchener medizinische Wochenschrift*, July 21, 1914.

ANESTHETIC, SELECTION OF. E. R. Horine, Louisville, Ky. *Kentucky Medical Journal*, October 15, 1914.

ANESTHETISTS, NON-MEDICAL, AND THE LAW. L. Irwell, Buffalo. *New York Medical Times*, September, 1914.

ANOCI-ASSOCIATION.—EVOLUTION OF SHOCKLESS OPERATIONS. H. M. W. Gray, London. *British Medical Journal*, August 22, 1914.

ANOCI-ASSOCIATION ANESTHESIA, EXPERIENCES WITH. E. C. Davis, Atlanta. *Georgia Medical Association Journal*, August, 1914.

ANOCI-OPERATING. W. P. Carr, Washington, D. C. *Virginia Medical Semi-Monthly*, October 9, 1914.

Anoci-Association in the Prevention of Shock and Post-Operative Discomforts. H. B. BUTLER and E. W. SHEAF, *British Medical Journal*, July 18, 1914.

Basing their opinion on 143 major operations performed under anoci-association, Butler and Sheaf conclude that it is ideal in preventing shock and ameliorating post-operative discomforts. Ward and Home Sisters who started out by being sceptical, are now quite convinced of its advantages, and declare that patients operated under anoci-association are no trouble after operation.

In two amputations through the thigh in old people, in addition to the usual novocain infiltration, the sciatic nerve was injected with quinine and urea, and there was no shock and practically no after-pain.

One girl of 17 years had a large one-sided goitre, which caused her great pain and dyspnoea. The operation for removal was conducted without the slightest anxiety, and recovery was normal and rapid. The same patient was subsequently operated on by another surgeon for enucleation of the tonsils and died under the anesthetic.

Necropsy revealed status lymphaticus. This would seem to indicate that anoci-association saved her from disaster on the occasion of the first operation.

So far there has been no trouble in the healing of the operative wounds.

APPARATUS.—IMPROVED ETHER INHALER. A. E. Gallant, New York *Medical Journal*, October 31, 1914.

Arterial Hypertension and Hypotension in Medicine and Surgery. H. H. ROBERTS, M.D., Lexington, Ky. *Southern Medical Journal*, September, 1914.

Roberts insists that during an operation there is nothing which will give the surgeon more reliable information as to the patient's condition than the repeated taking of the blood pressure by means of a sphygmomanometer. Preliminary measurement of the normal systolic pressure of the patient is one of the essentials in determining the vital resistance for any contemplated surgical procedure.

The effect of any anesthetic is exerted chiefly on the circulation, and the ability to withstand anesthesia safely depends in great measure on the integrity of the vasomotor and cardiomotor systems in maintaining blood-pressure at its normal level. The sphygmomanometer with an enlarged dial for easy reading should be used for ascertaining the circulatory tension at frequent intervals during the course of all operations. A fall in blood-pressure will give warning of impending danger long before any untoward symptoms of the pulse or respiration can be noted. In fact, the anesthetist opens himself to criticism if he neglects this precautionary method of anticipating the occurrence of shock.

The surgeon should realize that unnecessary manipulations of exposed viscera, their vessels, nerves, pedicles or messenteries, are productive of a determining fall in blood pressure, and the onset of surgical shock from trauma may be very precipitous. If the blood pressure falls as low as 100 mm. the danger line has been reached, and operative manipulations should cease, while saline solution is given, especially in the presence of hemorrhage.

Ordinarily during the induction of anesthesia there is a rise of tension due to stimulation of the cardiomotor and vasomotor centers through excitement or the anesthetic agents themselves, notably nitrous oxid and ether. Hypertension under nitrous oxid may become dangerous, unless asphyxia is absolutely controlled by the concomitant use of oxygen. Ether acts as a preliminary stimulant and raises blood-pressure slightly, and depression only follows after lengthy administrations, when too deep a degree of surgical narcosis has been maintained and muscular relaxation has been extreme. On the contrary, in

patients with hypotension, chloroform may cause sudden death by an abrupt drop in blood pressure, although the sphygmomanometer, in routine use, will do much to obviate such preventable catastrophies.

It is a mistake to use the sphygmomanometer only in the operative room or in the preliminary taking of the blood pressure. In hazardous risks the blood-pressure should be taken at intervals after the patient's return to bed to anticipate postoperative collapse.

BLOOD PRESSURE DURING ANESTHESIA AND ANALGESIA FOR DENTISTRY. E. I. McKesson, Toledo, New Jersey State Dental Journal, September, 1914.

CARDIAC FIBRILLATION AND ITS RELATION TO CHLOROFORM ANESTHESIA. J. A. McWilliams, British Medical Journal, September 19, 1914.

CHLOROFORM ANESTHESIA. E. C. Fisher, Richmond, Va. Virginia Medical Semi-Monthly, October 9, 1914.

CHLOROFORM AND ETHER ANESTHESIA, EFFECTS OF, ON PROTEIN CONTENTS OF BLOOD SERUM OF RABBITS. L. W. Buck, San Francisco. Journal of Pharmacology and Experimental Therapeutics, July, 1914.

Chloroform Toxicity and Hepatic Necrosis, Influence of Diet on. E. I. Opie and L. B. Alford, St. Louis. Journal American Medical Association, March 21, 1914.

By laboratory experiment and clinical results, Crile has pointed out the necessity for preserving the glycogenic functional activity of the liver, particularly in the presence of acidosis complicating operation and anesthesia. This view is supported by Opie and Alford, who, in carrying out their experiments upon animals, using chloroform as an anesthetic, and employing fats and meats, as well as carbohydrates as foodstuffs, found that animals which received a preoperative diet of carbohydrates all survived; whereas all of those receiving fats and meats died from the effects of the anesthetic. Microscopic examination of the liver in starch-fed animals showed scanty areas of necrosis, while in those under a fat and meat diet the hepatic necrosis involved from two to three-fifths of the lobules. This pernicious action of chloroform is probably due to its solubility and diffusibility in fats, which thereby determines its activity on the liver, resulting in pronounced necrosis.

Clinically it is therefore advisable to feed cardiac, renal and diabetic acidosis risks on gruels, supplemented by taka-diastase and pancreatin, up to within three hours of operation, and to establish this dietary as soon as possible after the anesthetic.

DANGERS OF ANESTHESIA, RECENT EXPERIMENTS DEFINING. Yandel Henderson, Surgery, Gynecology and Obstetrics, September, 1914.

DEATHS, ANALYSIS OF, OCCURRING IN THE COURSE OF 1,573 OPERATIONS. E. MacD. Stanton, Schenectady, N. Y. Albany Medical Annals, August, 1914.

DEATH DURING TONSILLECTOMY FROM REFLEX INHIBITION. H. Dupuy, New Orleans Medical and Surgical Journal, August, 1914.

Dentin, Anesthesia of the, With Albargin. DR. LICHTWITZ. Dental Cosmos, August, 1914.

Lichtwitz finds that albargin, a combination of silver nitrate with gelatose, answers all possible requirements as an obtunding analgesic for hypersensitive dentin. It is conveniently applied with a double-headed ball and spatula burnisher. It can be satisfactorily applied in hyperesthesia of the dentin at the cervical margin with incipient caries, in erosions, in hypersensitive dentin which is to be excavated in cavity preparation, in grinding teeth for crown and bridge work, in hyperesthesia due to close bite or attrition, and the carious deciduous teeth of children, in aphthae and all other inflammatory conditions in which silver nitrate is indicated.

A fragment of an albargin tablet is pressed upon the hypersensitive field of operation, where it is left adhering for the desired length of time. To prevent its dissolution the field is kept dry. It is rarely necessary to prolong the application beyond a period of five minutes, or to repeat the application.

A single application of albargin, in Lichtwitz's experience, has controlled the progress of caries in deciduous teeth during a period of two years; and has controlled hyperesthesia of the dentin at the cervical margin for as long as one year. In excavating hypersensitive cavities or in grinding down teeth, the effect of albargin as an analgesic is more prolonged than that of phenol, cocain, perhydrol or any other medicaments.

DIFFERENTIAL ATMOSPHERIC PRESSURE PROCEDURES. Berliner Klinische Wochenschrift, September 7, 1914.

DREAM, AN ETHER ANESTHESIA, PARTIAL ANALYSIS OF. J. E. Lind, Alienist and Neurologist, August, 1914.

ETHER ANESTHESIA. G. L. Closson, Seattle. Northwest Medicine, September, 1914.

ETHYL CHLORIDE, INDUCTION OF ANESTHESIA AND. C. Derderer, Los Angeles. California State Journal of Medicine, October, 1914.

Fearful Patients, Anesthesia For. H. SCHOLZ. Beiträge zur klinischen Chirurgie, June, 1914.

While patients who dread an operation may attempt to conceal their fear, under a placid exterior, their dread is generally revealed by some disturbance of visceral or vasomotor innervation, such as tachycardia, pseudo-angina, polyuria, glycosuria, diarrhea, angioneurotic edema, shallow and sighing respiration, pallor and dryness of the mouth. Scholz, in studying the condition of fearful patients, coming to operation, concludes that abnormal fear, alone, will precipitate acapnia. Such subjects are also prone to exhibit reflex syncope, during the induction of anesthesia, on account of the irritation by the anesthetic vapors of the nasal terminals of the trigeminus, and coincidentally the terminals of the vagus in the heart and in the respiratory centers of the medulla. Rosenberg has found that cocainization abolishes this reflex, and Gwathmey overcomes it by the use of essence of bitter orange peel.

Fearful patients suffer a constant decline in blood-pressure during the induction of anesthesia by ether or chloroform, the average decrease being 45 mm. of mercury in 15 minutes, or until the stage of surgical narcosis has been reached. Even then further decreases may be noted during visceral manipulation.

Scholz considers the persistence of a dilated pupil, during the induction of chloroform anesthesia, as a sign of impending danger. Also it is possible to induce fainting from sheer fright, if fearful patients, who are struggling, are too forcibly controlled.

Scholz corroborates the views of MacCardie on disasters occurring in the Trendelenburg posture, and illustrates his contention with roentgenograms of anesthetized dogs, showing the remarkable displacement of the diaphragm due to changes in posture. Collapse in the head-down position may be entirely due to mechanical obstruction to the pumping action of the heart.

FITZGERALDISM—WHAT IS IT? (PRESSURE ANALGESIA). Wm. Harper DeFord, Des Moines, Ia. New Jersey State Dental Journal, September, 1914.

Impurities in Commercial Nitrous Oxid for Dental Use, and Their Injurious Effects by Inhalation. W. B. HART and F. W. MINHALL, British Dental Journal, June 15, 1914.

In their carefully tabulated analyses, Hart and Minhall have found that, considering the short interval of time that nitrous oxid is inhaled in dental anesthesia, and the large dilution of the gas by air or oxygen for analgesia the minute amounts of gaseous impurities found in the samples examined by them, are in general too small to have any effect on the patient, and it would appear that nitric oxid is the impurity that calls for special attention.

The purity of the gas can be maintained and the operation of purification simplified by the use of the purest ammonium nitrate as raw material. The use of ammonium sulfate or sodium nitrate calls for extraordinary precautions in manufacture, in view of the varying quality of these materials on the commercial market.

While Baskerville and Stevenson recommend a minimum of 95 per cent. of nitrous oxid in the commercial product, there appears to be no difficulties in the manufacture of a gas of 98 per cent., as the authors show in a table of American analyses.

Basing their conclusions on their analytical results, Hart and Minhall propose the following recommendations as to the quality of commercial nitrous oxid for anesthetic and analgesic use:

Nitrous oxid, 98 per cent. minimum; moisture, not to exceed 0.0002 gram per 100cc.; carbon dioxid, not to exceed 0.05 per cent. by volume; nitric oxid not to exceed 0.001 per cent. by volume; ammonia, not to exceed 0.001 per cent. by volume; hydrochloric acid, chlorin and its oxids, iododin, sulfur dioxid, sulfuric anhydrid, hydrogen sulfid, carbon monoxid, nitrogen, tri-, tetra-, and pentoxids, cyanogen, hydrocyanic acid, hydrogen phosphid, arsenid and antimonid, ozone, dust and all other impurities to be absent in an examination of 20 liters of the gas.

GENITO URINARY TRACT, GENERAL ANESTHESIA WITH SPECIAL REFERENCE TO THE SURGERY OF. J. T. Gwathmey. New York Medical Journal, November 7, 1914.

GENITO URINARY TRACT, LOCAL ANESTHESIA IN RELATION TO THE SURGERY OF. J. F. Mitchell, Washington, D. C. New York Medical Journal, November 7, 1914.

HIGH FREQUENCY ANALGESIA. Milton D. Neef. Dental Summary, November, 1914.

IMPURITIES IN NITROUS OXID. H. D. Haskins. Cleveland Medical Journal, August, 1914.

INTRA-ORAL OPERATIONS, ANESTHESIA FOR. F. H. McMechan. Cincinnati Medical News, August, 1914.

INTRAPHARYNGEAL ADMINISTRATION OF WARMED ETHER BY THE NASAL ROUTE. H. M. Page. Lancet, July 18, 1914.

INTRATRACHEAL INSUFFLATION. B. M. Ricketts, Cincinnati. Medical Record, September 19, 1914.

INTRATRACHEAL INSUFFLATION OF ETHER. H. T. Thompson, Edinburgh Medical Journal, August, 1914.

INTRAVENOUS ETHER ANESTHESIA. H. Kummell, Hamburg. Surgery, Gynecology and Obstetrics, September, 1914.

LOCAL ANESTHESIA. H. A. Brady, Danville, Va. Virginia Medical Semi-Monthly, September 11, 1914.

LOCAL ANESTHESIA. T. Torland, Seattle. Northwest Medicine, September, 1914.

LOCAL ANESTHESIA IN MAJOR SURGERY. W. A. Shelton, Kansas City. Missouri State Medical Association Journal, October, 1914.

LOCAL ANESTHESIA, OPERATIONS FOR INGUINAL HERNIA UNDER. J. A. Bodine, New York. Medical Record, September 20, 1914.

LOCAL ANESTHESIA IN RECTAL SURGERY. D. R. Pickens, Nashville. Tennessee State Medical Journal, September, 1914.

LOCAL ANESTHESIA, CONDUCTION AND INFILTRATION. B. R. East, Detroit. The Dental Summary, September, 1914.

LOCAL ANESTHESIA, THYROID OPERATIONS UNDER. F. H. Lahay. Boston Medical and Surgical Journal, October 8, 1914.

LOCAL ANESTHESIA, INTRAVENOUS, TOTAL PERIPHERAL ANALGESIA AFTER. A. W. Meyer. Archives für klinische Chirurgie, CV, No. 1.

Local Anesthesia in Over 1,000 Major Surgical Operations. J. A. CRISLER, Memphis, Tennessee State Medical Journal, July, 1914.

While Crisler has found nitrous oxid-oxygen anesthesia in conjunction with hyoscine-morphin, almost ideal in selected cases, he has found some patients who could not be thoroughly relaxed under it, and a few in whom surgical narcosis was impossible for a period sufficiently long for an average operation. Its objectionable features lie in the fact that an exceptionally experienced anesthetist is required for its administration and the necessary apparatus is only available in well-equipped hospitals.

Three years ago he began the use of hyoscine and morphin in connection with novocain to the exclusion of other anesthetics in operations for goitre, and he has gradually extended the use of these agents into abdominal surgery with gratifying results.

Three preliminary doses of morphin-hyoscine are given to secure amnesia and partial analgesia. The anaer association technic of Crile is followed in obtunding the abdominal wall and the operative areas, and inhalation narcosis is only resorted to in about 25 per cent. of routine cases, in which the analgesia is not efficient on account of acute inflammatory conditions.

While the method lengthens the operative period, this objection is offset by the decrease in manipulative trauma, and peripheral shock. The technic also obviates anesthesiophobia, postoperative nausea, and diminishes the tendency toward flatulency, irritation of the kidneys and bronchial mucous membranes, and biliary necrosis.

The only complications noted in over 1,000 major operations were three cases of epileptiform convulsions, which occurred while operating in the neighborhood of the uterus and bladder. These seizures were brief and without any ill-effect. Artificial respiration has not been necessary in a single instance, although as much as a grain of morphin and 1/25 grain of hyoscine was used to secure narcosis. Coincidentally as much as two ounces of a 2 per cent. solution of novocain has been used without any toxic manifestations.

LOCAL ANESTHETICS, COMBINATION OF, WITH POTASSIUM SULPHATE. A. Hoffmann and M. Kochmann. Beiträge zur klinische Chirurgie, May, 1914.

LOCAL ANESTHETIC, QUININE AND UREA HYDROCHLORIDE AS A. IN EXPLORATORY OPERATIONS. E. D. Twyman, Independence, Mo. Missouri State Medical Association Journal, September, 1914.

LOCAL ANESTHETICS—SOME COMPARATIVE PHYSIOLOGICAL REACTIONS. O. E. Clossons, Detroit. Michigan State Medical Society Journal, October, 1914.

MAGNESIUM SALTS, ETHER AND CHLOROFORM. Editorial. Journal American Medical Association, August 15, 1914.

MORPHIN, LIMITATIONS AND USES OF, AS AN AID TO ANESTHESIA. J. S. Keyser, Wilmington. Delaware State Medical Journal, July, 1914.

NITROUS OXID-OXYGEN ANESTHESIA. H. L. Geary, Seattle. Northwest Medicine, September, 1914.

Nitrous Oxid, Some Considerations After 13,000 Administrations of. W. I. JONES, D.D.S., Columbus O., Ohio State Medical Journal, August, 1914.

Jones reports thirteen thousand administrations of nitrous oxide-oxygen with but one fatality on the table, in an extra-hazardous risk. While a large percentage of the anesthetics were for dental, quite a percentage were for major surgical operations in bad subjects. His youngest patient was four weeks, for cleft palate; his oldest 86 years, for prostatectomy.

His experience with nitrous oxid-oxygen in brain surgery corroborates Teter's, satisfactory anesthesia being maintained by 92 parts nitrous oxid and 8 parts oxygen. experiments during the operations proved conclusively that discoloration, dilatation and protrusion of the brain occurred only in the presence of oxygen deprivation, and assumed dangerous proportions only when asphyxia was imminent. Jones has met with occasional instances of acapnia in anemic and asphyxia in plethoric, obese or alcoholic subjects; but all cases responded promptly to artificial respiration and perfusion with oxygen.

McKesson's findings regarding blood pressure during 4,000 nitrous oxid-oxygen anesthesia are also corroborated in Jones' experience, and he has observed that any imperiling turgescence of blood vessels, even in the presence of arterio-sclerosis must be the result of either asphyxia or pushing the anesthesia beyond the depth required for surgical interference.

For safe and satisfactory results with this technic of anesthesia Jones suggests that the anesthetist should bring as much skill to its administration as the surgeon does to the operation. He offers his records and the desperate character of many of the cases handled to contravert the efforts of some surgeons to indiscriminately condemn the technic.

Ether in small amounts for purposes of relaxation was necessitated in from 20 to 25 per cent. of the cases recorded.

Jones concludes that while nitrous oxid-oxygen anesthesia does not make the work of the surgeon easier, it is immeasurably better for the patient.

NOVOCAIN POISONING. R. P. Giffen and F. F. Gundrum, Santa Barbara. *California State Journal*, October, 1914.

OIL-ETHER COLONIC ANESTHESIA. J. T. Gwathmey, New York. *Medical Record*, October 3, 1914.

OIL-ETHER COLONIC ANESTHESIA. W. W. Spargo, Albuquerque. *New Mexico Medical Journal*, July, 1914.

PARAVERTEBRAL ANESTHESIA FOR GALL BLADDER SURGERY. A. T. Jurasz. *Zentralblatt für Chirurgie*, August 29, 1914.

Posture in Relation to General Anesthesia. MACCARDIE, Birmingham. *Proceedings of the Royal Society of Medicine, Section of Anesthetics*, April, 1914.

While the Trendelenburg posture may be advantageous to the surgeon during certain phases of operative procedures, it may give rise to complications that jeopardize the life of the patient or that make the maintenance of general narcosis extremely hazardous. It is McCordie's opinion that frequently anesthetics have been blamed for these complications which are really induced by this particular posture, especially when the angle of inclination has exceeded 45 degrees. The posture not only promotes copious venous hemorrhage, and embarrasses pulmonary ventilation, but also puts an additional strain on the heart. Likewise it seems to be an important factor in the occurrence of post-operative pneumonia and bronchitis; and Zweifel holds it occasionally responsible for post-operative intestinal obstruction, surgical emphysema, apoplexy and acute dilatation of the stomach. Zweifel reduced the incidence of pulmonary embolism from 18 cases in 1,800 operations to 3 in 800, by resorting to the posture as infrequently as possible, and then maintaining the extremities in the same horizontal plane as the body instead of allowing them to be flexed over the end of the table.

The recent researches of Meltzer, Auer and Githens on the curare-like action of ether in promoting the fatigability of musculature, explains why the Trendelenburg posture is more dangerous during ether narcosis than when chloroform is used; or when, according to Gatch, Gann and Mann, the patient is properly under the influence of morphine. These observers conclude that the ill-effects of the Trendelenburg posture are due primarily to failure of respiration, and can only be combated by the stimulation of hypercapnia. In the presence of even mild grades of asphyxial embarrassment, the entire mechanism with which the body compensates for the effects of gravity, is put to an exhaustive strain, and the heart has to pump against an increased arterial pressure at a time when it is poorly able to respond.

McCordie concludes by advising that the posture be resorted to as infrequently as possible; and then only for brief periods, and that it should not be used at all on patients suffering from obesity, obstructed breathing, cardiac, renal or arterial complications. Also the posture should be sustained by support at the shoulders, and not by allowing the legs to hang over the edge of the table, in order to obviate the danger of thrombosis.

Gatch has even found it advisable to operate some hazardous risks, under gas-oxygen anesthesia in a semi-sitting position or the reverse Trendelenburg.

PROSTATECTOMY UNDER LOCAL ANESTHESIA. Emory Lanphear, St. Louis. *The Urologic and Cutaneous Review*, November, 1914.

PSYCHIC FACTORS OF SURGICAL ANESTHESIA. R. H. Ferguson, East Orange, N. J. *Illinois State Medical Journal*, August, 1914.

RECORD CARD FOR THE ANESTHETIST. P. L. Flagg, New York. *Journal American Medical Association*, September 19, 1914.

REGIONAL ANALGESIA FOR ABDOMINAL OPERATIONS. H. Hackenbruch. *Deutsche Zeitschrift für Chirurgie*, CXXVIII, Nos. 5-6.

SCOPOLAMIN-MORPHIN, USE OF, IN LABOR. A. Rongy and S. S. Arluck. *New York Medical Journal*, September 19, 1914.

SCOPOLAMIN-MORPHIN IN LABOR. Magnus Tate, Cincinnati. *Lancet-Clinic*, October 24, 1914.

SCOPOLAMIN-NARCOPHIN SEMINARCOSIS IN LABOR. A. Harwar and R. McPherson, New York. *American Journal of Obstetrics*, October, 1914.

SHOCK, TREATMENT OF, CONSERVATION VERSUS STIMULATION. C. S. Holt, Fort Worth. *Arkansas Medical Society Journal*, September, 1914.

SHOCK, PSYCHIC, FOLLOWING OPERATIONS. J. E. Engstad, Minneapolis. *Journal-Lancet*, October 1, 1914.

SHOCK, TRAUMATIC. S. W. Hobson, Newport News. *Virginia Medical Semi-Monthly*, October 9, 1914.

Shock, Peripheral Origin of. F. C. MANN, Indianapolis. *Bulletin of Johns Hopkins Hospital*, July, 1914.

While Mann found it possible to produce the usual signs of shock in animals by means of excessive heat or cold, the condition supervened far more readily by exposure and trauma of the abdominal viscera. With the abdominal wall intact and hemorrhage prevented, Mann found it impossible to reduce anesthetized animals to a state of shock by any degree of sensory stimulation. While the respiratory center is more quickly injured by shock than any other vital center, acapnia is not a primary factor in its incidence. The vasomotor is the most resistant of all vital centers and is not depressed nor fatigued in shock. That shock is due to primary failure of the heart, due to involvement of the cardio-inhibitory or cardio-accelerator mechanism, cannot be maintained, since the peripheral and untraumatized visceral arteries are constricted in its presence.

While shock produced by exposure and trauma of the abdominal viscera may be partly due to a paralysis of the vasomotor mechanism of the splanchnic area, still Mann considers that the more important factor is the tremendous loss of red cells and fluid from the blood, due to the reaction of the great, delicate vascular splanchnic area to irritation—an acute inflammation of the peritoneum due to operative trauma and exposure to changes of temperature. The peritoneum offers an area of exposure equal to the entire cutaneous surface of the body, and the supervention of shock, similar to the abdominal type, only occurs when a great area of subcutaneous tissue has been exposed and traumatized.

Muscular relaxation, decreased abdominal pressure, and impaired respiration are accessory factors, because they tend to decrease the amount of blood returned to the heart. A relatively slight decrease in blood-supply markedly depresses the cellular activity of the cerebral cortex, and degenerative changes in the cells of the central nervous system are the result and not the cause of shock. General anesthesia, just short of the loss of muscle tone, prevents painful impulses from affecting the cells of the central nervous system. Under such conditions, Mann considers nerve blocking as useless in the prevention of shock.

According to Mann, the term "shock" should only be used to apply to the patient's condition when, without any grossly discernable hemorrhage having occurred, the amount of circulatory fluid is greatly diminished on account of stagnation of the blood in the smaller veins and capillaries or by exudation of the fluid and cellular elements of the blood from the same.

SPINAL ANESTHESIA. J. Overton and L. E. Burch, Nashville, Tenn. *The Southern Practitioner*, October, 1914.

SPINAL ANESTHESIA. C. G. Parsons. *Denver Medical Times*, November, 1914.

SPINAL ANESTHESIA, EXPERIENCES WITH. A. Gfoerer. *Muenchener medizinische Wochenschrift*, September 8, 1914.

SPINAL ANESTHESIA IN UROLOGY. G. G. Smith, Boston. *Inter-State Medical Journal*, November, 1914.

TRIGEMINAL NEURALGIA, TREATMENT OF, BY INTRACRANIAL INJECTIONS OF ALCOHOL. Hartel. *Deutsche Zeitschrift für Chirurgie*, Band 126, Heft 5-6, 1914.

TRIGEMINAL AND OTHER NEURALGIAS, SOME EXPERIENCES WITH ALCOHOL INJECTIONS IN. Wilfred Harris, London. *Journal American Medical Association*, November 14, 1914.

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No. 2

PRE-CANCEROUS LESIONS AND TRANSITION TYPES OF MALIGNANT DISEASE OF THE TONGUE AND THEIR RELATION TO SYPHILIS; WITH REMARKS ON EARLY DIAGNOSIS AND OPERATION.

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In no department of surgery are mistakes in diagnosis and treatment more frequently made than in the surgical diseases of the tongue. Nowhere are the results of inaccurate diagnosis and ill-advised treatment more deplorable. The truth of this has so frequently been impressed upon me during thirty-five years of abundant opportunities for observation, that I feel that the profession cannot be too often reminded of the sources of error and of its duty in this field.

Strange to say, improvements in our diagnostic resources often have ill served us in the diagnosis and treatment of diseases of the tongue. The microscope and the Wasserman test alike are friends from which we frequently should be saved. These diagnostic handmaidens have been responsible for the loss of valuable lives and much discredit to the art of surgery. This sounds treasonable, but one must needs form a few definite conclusions from wide experience. I shall later endeavor to justify these conclusions.

The various forms of diseases of the tongue which, by their intimate etiologic or differential diagnostic relations to malignant disease, are of especial interest to the surgeon, have been well outlined by Butlin:¹

1. "Predisposing conditions, such as leukoplakia, ichthyosis—chronic superficial glossitis—which may exist for many years without the occurrence of cancer, but which undoubtedly render the individual more liable to cancer than are individuals in whom the tongue is healthy.

2. "Pre-cancerous conditions, such as wart growths, thick plaques, sore places, which are not

exactly cancerous, but which inevitably proceed to cancer unless they are completely removed or destroyed.

3. "Actual cancer, in one of its various forms, when it is obvious to an educated surgeon, and ought to excite suspicion in the minds of persons who are not experts."

The conditions enumerated by the distinguished English surgeon are, unfortunately, what may be termed (a) pre-terminal and (b) terminal conditions. Underlying all we should recognize (1) etiologic factors of which the local pathologic conditions are merely the outward expression, and (2) factors of local irritation which act merely by determining or localizing the conditions.

Sutton² states that epithelioma of the tongue is preceded in 20 per cent. of cases by "leucoplakia and ichthyosis, which are frequently referred to as pre-cancerous conditions." He further says: 1. "Ichthyotic patches do not necessarily become epitheliomatous. 2. Epithelioma attacking an ichthyotic tongue does not always begin in the ichthyotic patch. 3. The stump of an epitheliomatous tongue may become ichthyotic after removal and yet malignant disease not recur in it."

These observations of Sutton's do not lessen the importance of ichthyosis in the etiology of tongue cancer. The same underlying predisposition which leads to ichthyosis—leucoplakia—may develop epithelioma precociously in another part of the tongue, while in the case of the ichthyotic patches occurring in the amputation stump of an epitheliomatous tongue, the patient is not likely to live long enough to experience a recurrence at the site of the leucoplakia. It must be remembered, too, that the supervention of carcinoma upon leucoplakia may not occur for many years, during which the case is likely to go through the hands of many surgeons. Many cases perish from syphilitic degenerative conditions before the leucoplakia has had time to undergo malignant change.

There is little doubt that syphilis, mercury, alcoholics, and smoking or chewing tobacco, or all these causes combined, are the usual exciting causes: first, of glossitis; second, of leucoplakia; third, of

¹ Henry T. Butlin. Monograph. Diseases of the Tongue, and British Med. Journ., Apr. 6, 1890, and Apr. 14, 1894.

² J. Bland Sutton, Tumors, Innocent and Malignant, 1893.

carcinoma. The fact remains, however, that it is only in those who are predisposed to pathologic changes in the mucosa who develop the more serious conditions. As Butlin³ says: "The fact that thousands of persons are subjected to the various sources of irritation mentioned is no argument against their potency as etiologic factors." I will go further and state, as my opinion, that the large number of exceptions really emphasize the dangers of such conditions, merely by arguing the existence of a special predisposition.

For practical purposes the author has formulated the etiology of carcinoma of the tongue as follows: viz.:

CAUSES OF CANCER OF THE TONGUE.

Primary predisposing cause	{ Heredity (?) inherent tissue tendency to cancer.
Secondary predisposing causes (Irritative)	{ Congenital malformation of the tongue Uncleanliness of mouth Syphilis Tobacco Alcohol Caustics Mercury Bad teeth Gumma Ulcers
Exciting causes (Irritative)	{ Mucus patches Cicatrices Fissures Leucoplasia ('Leucoplakia,' 'lethtyosis,' 'hyper-Keratosi,' 'chronic superficial glossitis')

The rôle which congenital malformation plays in the etiology of the conditions underlying cancer of the tongue is not thoroughly appreciated. The "raspberry" tongue and other conditions in which the tongue is fissured, or its border crenated, with exaggerated development of the papillae, are often responsible for the development (1) of glossitis, (2) of leucoplakia, and (3) of malignant disease. Figure 1 shows a tongue of this kind which later developed malignancy. (Case 2.)

The rôle which prolonged irritation *per se* plays in the etiology of epithelioma probably is well

shown by the observations of Albarran,⁴ Annas,⁵ and Binaghi,⁶ on the association of psorosperosis with epithelioma. Bryant⁷ reports several cases of epithelioma originating in presumably non-specific ulcers and cicatrices. Eve⁸ also shows very clearly the importance of irritation *per se* in the etiology of epithelioma.

The etiologic relation of syphilis to malignant diseases of the tongue has been fairly well established by a considerable number of observations. (One of the earliest of these noted—indeed, the earliest relating to sarcoma that I have been able to find—was a case of my own,⁹ which will be presented later. Some of the observations upon the

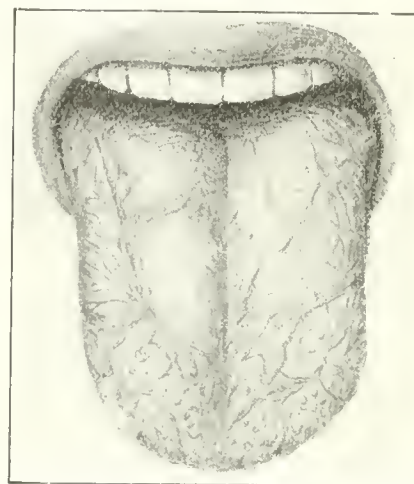


Fig. 1. Congenitally fissured tongue, with hypertrophy of the papillae, and later development of leucoplasia, in an old syphilitic (Case 2). Malignancy finally developed in this case. (From sketch by the author.)

co-relation of cancer and syphilis and the difficulties of differential diagnosis are worthy of especial comment because of their distinctly illustrative value.

Jonathan Hutchinson,¹⁰ and, following him, Von Langenbeck, early called attention to the etiologic relation of syphilis to cancer, *i.e.*, "combined" syphilis and cancer.

Verneuil and Ozenne¹¹ some years later called attention to what they considered a simultaneous development of cancer and tertiary syphilis of the tongue, forming a "cancero-gummosus" lesion.

Zancerini claims that syphilis creates "a special predisposition to cancer, by the local irritation and

⁴ Sur des tum. epithel. contenant des sporospermies., Compt. rend. Soc. de biol., Paris, 1889.

⁵ Sulla Presenze dei blastomiceti negli epitheliomi e sulla loro importanza parassitaria., Policlin., Roma, 1896.

⁶ I blastomiceti negli epitheliomi., Policlin., Roma, vol. XI, 1895.

⁷ Lancet, London, vol. XI, 1882, and vol. I, 1884.

⁸ Relation of Epithelioma to irritation and Chronic inflammation, Brit. Med. Journ., vol. I, 1881.

⁹ Malignant Transformation of Syphiloma of the Tongue, N. Y. Med. Rec., N. Y., Aug. 26, 1889.

¹⁰ Med. Press and Circular, vol. XI, 1883.

¹¹ Quoted by Fournier, without reference or date.

general nutritive disturbance produced by its toxins."

Lang, in 1886, reported three cases of cancer of the tongue which he attributed to degeneration in syphilitic lesions. One of his cases is especially interesting.

"Case —. A middle-aged woman had suffered from syphilis for a protracted period. Scars of former syphilitic process present upon the trunk and face, the palate being perforated and the upper lip having suffered considerable loss of substance. At the time she came under observation most of the ulcers were covered with a white scab, the histologic examination of which did not reveal any sign of diagnostic importance. About a month later, however, a small, white, indolent ulceration appeared upon the hard palate. A small portion of the involved tissue was excised and upon microscopic examination was found to be epithelioma."

Lang states that he had observed three other very similar cases, the development of the carcinoma upon the syphilitic soil being demonstrated in each instance by microscopic examination. The first case that came under his observation had suffered from a characteristic course of syphilis, including numerous relapses of iritis and gummatous ulcerations that had cicatrized, with the exception of one which became transformed into a "cancroid" of the skin. The second case was that of a man, aged 46, who had suffered from various syphilitic ulcerations on different parts of the face and body. After anti-syphilitic treatment, one ulcer, located beneath the tongue, proved resistant to treatment and became transformed into cancer. In the third case, a syphilitic infiltration located in the lower lip underwent a relapse at the end of a year and assumed a carcinomatous character.

Von Esmarck,¹² in 1889, called attention to the association of sarcoma with syphilis, laying especial stress upon sarcomatous degeneration of tissues affected by syphiloma. He especially deplored the delay in accurate diagnosis in such cases until too late to save life by operation. The author operated a case of this kind in 1884. (Case I to be described later.)

Dubois-Havenitti¹³ reports a very interesting case showing the difficulty of making a differential diagnosis between gummatous ulcer of the tongue and epithelioma. The ulcer in this case was located on the border of the tongue, the surface of the organ showing "leucoplakia." A "sub-maxillary adenitis" was present. Repeated microscopic examinations failed to show malignancy. On the other hand, specific treatment aggravated the condition. The con-

clusion of this case has not been recorded, but it would be easy to surmise what finally happened.

Chifolian and Duræux¹⁴ report a case of "mixed syphilis and cancer" of the tongue. The authors state that in such cases the malignant growth generally develops in the cicatrix of an old lesion or in a leucoplakic plaque.

Du Castel¹⁵ reports a case of ulcer of the tongue in which the differential diagnosis between epithelioma and syphiloma was the subject of varying opinions. To my mind this was either a definitely malignant or a "borderline" case, in any event demanding excision.

The difficulties attending differentiation of epithelioma and syphiloma of the tongue are well illus-



Fig. 2. Incipient leucoplasia buccalis in advanced syphilis (Case 3), showing superficial hyperplasia and hyaline degeneration (Keratinosis) of epithelium (X 130).

trated by the so-called "hybrid" types of tongue disease, the characteristics of syphilis and those of cancer being combined.¹⁶

Kenny¹⁷ reports a case of "combination of syphilis and epithelioma" in a man of 49 years. A nodule appeared on the left side of the base of the tongue several months after a typical gummatous ulcer on the right pillar of the fauces had healed under anti-syphilitic treatment. The excised nodule proved to be epithelioma. "Combination" in this case is an unhappy nomenclature. There was merely a co-existence of syphilis and cancer in the same subject, with no evident real correlation. No observations were made on the matter of transition in type. Some very interesting observations on the microscopic study of the excised tissue were made:

¹² Ann. des Mal. Vener., May, 1913.

¹³ Ann. de Derm. et de Syph., vol. XXV, 1894.

¹⁴ Ueber die Aetiologie und Diagnose der Carcinome insbesondere derjenigen der Zunge und Lippe, Allg. Wien. med. Ztg., 1889, XXXIV, and Cent. f. Chir., vol. XVI, 1889.

¹⁵ Bellaserra, Estudio clinico e anatomo-patologico del goma-lingual sifilitico y de la hibridez cancro-esclero-gomosa; tratamiento. Rev. de cien. Med. Barcel., vol. X, 1884.

¹⁷ Australasian Med. Gaz., Dec. 20, 1898.

1. "Masses of epithelium dipping down continuously from the epithelium on the dorsum of the tongue into a mass of connective tissue material in a more or less irregular manner.

2. "Masses of epithelium from the opposite side, apparently much broader in outline than those of No. 1, but not invading the connective tissue so deeply or so irregularly.

3. "At various parts, chiefly on the surface or just below the surface of the epithelium mentioned under (1) a number of concentric horny masses, not unlike cell-nests, on superficial examination." (See Fig. 4, author's case, for similar appearance.)

4. "Scattered through the connective tissue are a large number of small round cells, with one, and occasionally more than one, nucleus, and in parts can also be seen a number of islets of epithelium, quite separated from the prolongations of the epithelium mentioned in No. 1. Also in parts the coats of the small vessels seem thickened, especially the intima.

A study of the processes of epithelium.

"If there are many secondary processes found jutting out in irregular directions, it should arouse some degree of suspicion, and especially if these processes are exciting any irritation of the connective tissue. The connective tissue grows in a normal manner if left to itself, but immediately any growth of epithelium takes places into it, it seems to act on it in much the same way as other aseptic foreign substances, producing some vascular reaction.

A study of the cell-nests and deep layers of cells of the processes.

"The cell-nests should be searched for any signs of multiplicity of nuclei, secondary fatty degeneration, etc. In the cells composing the nests, and in the Malpighian layer, when actively dividing, are often seen evidences of division of the nuclei, whereas normal cells cut in a partly horizontal way are mono-nucleated.

"Close observation of the connective tissue for evidences of irritation, especially in the region where the processes seem to be abnormally long, or the Malpighian deep cells seem to be actively proliferating."

The microscopist's report was "a tumor beginning to be malignant."

Archibald Smith¹⁸ reported a case of "Syphilitic Tongue with Commencing Malignancy" supervening upon "leucoplakia" lingualis. This presented the appearance of a fungating gumma on the left

side of the dorsum, surrounded by epithelial proliferation. The pathologist's report was "papillary outgrowths with much subcutaneous round-celled infiltration. One portion shows so much activity that it must be pronounced a squamous-celled epithelioma."

The conditions improved somewhat under anti-syphilitic treatment.

W. I. Wheeler¹⁹ reported three cases of epithelioma supervening upon gumma of the tongue. The author remarked that old syphilitic deposits were "fertile sources for cancerous development." His clinical experience in this regard and the obstinacy of such growths led him to excise them. The microscope showed early malignant development in all

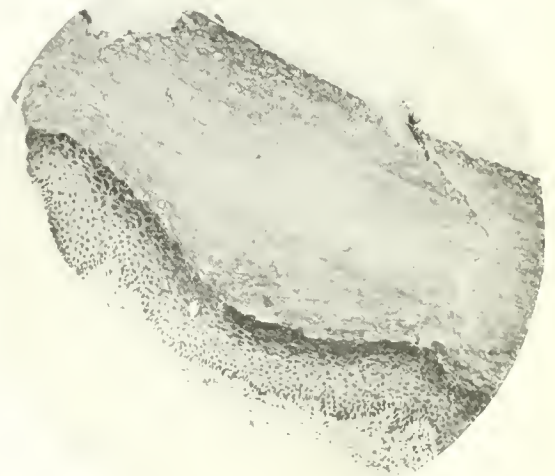


Fig. 3. Advanced stage of leucoplakia labialis, in syphilis of long standing (Case 2). Showing marked epithelial hyperplasia with advanced hyaline degeneration. (Keratinosis) X 70.

three cases. Wheeler recommends early operation in all persistent growths or deposits in the tongue because of their proneness to develop into cancer. The pre-cancerous stage of such growths he logically believes to be the ideal time for operation. His cases, apparently, were treated by circumscribed resection.

Fournier²⁰ reports a case of "mixed" or "syphilo-epitheliomatous" glossitis. This type of epithelioma of the tongue in a syphilitic, in my opinion, is due to a mere coincidence of the two diseases. Such cases are a little trying as to diagnosis, but the swelling and discomfort due to the superadded syphilitic element subside under specific therapy. Unfortunately, the malignant induration which is left behind is likely to be temporized with until it

¹⁸ Syphil. depos. in the Human Tongue followed by Epithelioma. Trans. Royal Acad., Ireland, vol. VII, 1889.

²⁰ Bull. Soc. Fr. de Derm. et de Syph., 1898.

is too late. The same may be said of complicating mixed-infection-glossitis in cancer, which may subside under any sort of treatment, providing it be not irritative. Errors in diagnosis under such conditions are frequent—and sometimes excusable. Mercurial glossitis, complicating both syphiloma and cancer, is a not infrequent source of confusion.

In an able and well illustrated paper by Emanuel Friend,²¹ attention is called to the necessity for early diagnosis in suspicious ulcerative conditions and new growths of the tongue. He reports a number of striking cases illustrating his point. He lays especial stress on the frequency with which "leucoplakia" acts as the foundation of malignant new growths.

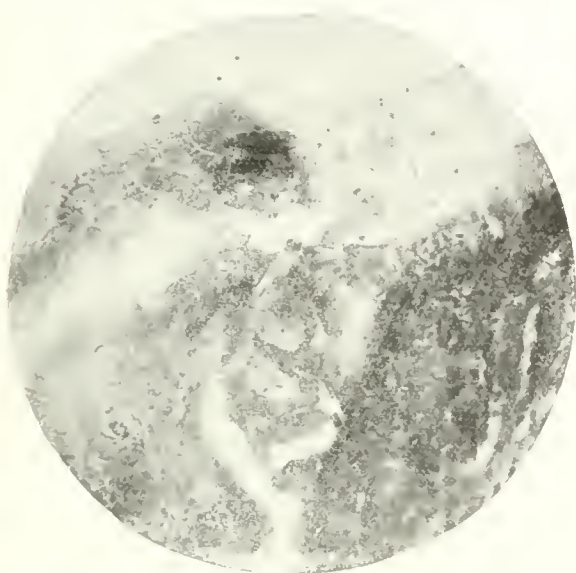


Fig. 4. Superficial hyaline degeneration (Keratosis) in epithelioma of the tongue succeeding leucoplakia in advanced syphilis (Case 5), showing "nest" of proliferation and degeneration of epithelium near periphery (X 235).

My own experience has led me to the conclusion that malignant disease is to be apprehended in all cases of obstinate "leucoplakia," and of gumma of the tongue, and that the condition therefore, as a rule, is not to be temporized with.

In my text-book,²² published in 1899, appears the following:

"Certain lesions of the mucus membrane in late syphilis are most typically sequelar. They are the result, not only of syphilis *per se*, but of numerous other factors to which the mucus membranes are exposed during the active period of the disease or during the intermissions between the active manifestations. The post-syphilitic character of the lesions is so marked that anti-syphilitic treatment often either has no effect or is injurious. These

lesions occur in the form of hyperplastic mucus and submucous infiltrations, classed by different authorities as leucoplakia or leucoplasia—terms intended to convey their characteristic whitish appearance and tendency to the formation of distinct hyperplastic plaques (Figs. 1-5-7). Post-syphilitic leucoplasia is probably as comprehensive and accurate as any term thus far suggested.²³ The term psoriasis, ichthyosis, tylosis, leuco-keratosis, diskertosis, and hyper-keratosis serve simply to add confusion to the subject.

"It may be doubted whether leucoplasia should be classified as a distinct pathologic entity, but seemingly these lesions are sufficiently characteristic to warrant such classification. From a clinical standpoint there can be no question of accuracy."

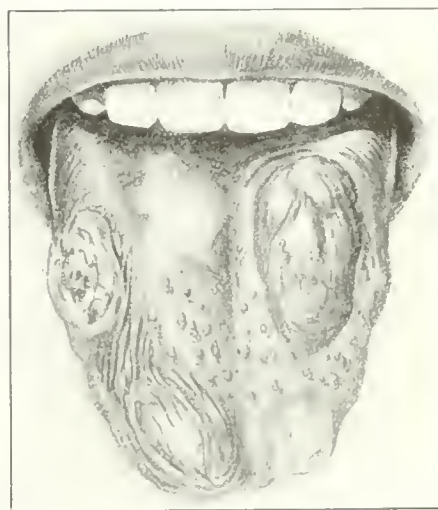


Fig. 5. Epithelioma of the tongue developing in congenitally malformed tongue in advanced syphilis, following glossitis and leucoplasia of long standing (Case 2). Showing areas of leucoplasia and sclerosed nodules at site of former yummata, one of which, on the right side of the tongue, is breaking down. Plaques of leucoplasia also are seen, and the tongue is thickened by recurrent attacks of glossitis. The appearance of the tongue, as seen in Fig. 1, has been changed by the sclerotic process and "glazing" of the surface. (From sketch by the author.)

Perrin believes that:

1. The white hyperplastic plaques, presenting themselves as syphilitic phenomena, have for their elementary characters functional and organic disturbances of the epithelium.
2. They may occur as a consequence of both the syphilis and anti-syphilitic treatment.
3. In some instances there exists some peculiar morbid constitutional condition or diathesis as the predisposing cause of leucoplasia.
4. Such conditions are peculiarly likely to occur in both syphilitic and non-syphilitic patients addicted to tobacco.
5. There is a large number of cases of mixed character in which the condition is

²¹ Ill. Med. Journ., September, 1910.

²² Genito-Urinary, Venereal and Sexual Diseases.

²³ The etiology of leucoplasia—or leucoplakia—and its relations to cancer of the tongue were also discussed in my paper in the N. Y. Med. Rec., Aug. 26, 1889.

excited by syphilis and tobacco combined in gouty or rheumatic subjects.

With reference to the relation of syphilis to leucoplasia, the occurrence of the latter independently of the former must be taken into consideration. Indeed, contrasting the small proportion of patients who develop leucoplasia with the larger number who indulge in tobacco and liquor—with or without overactive mercurial therapeutics—it is rational to infer that, even in cases in which syphilis appears to be primarily responsible for leucoplasia, the subject is the victim of some peculiar predisposition that differentiates him from the average syphilitic. In several instances the author's attention has been directed to the question of idiosyncrasy as an explanation for the occurrence of leucoplasia by the occurrence of such lesions in non-syphilitic blood relations.

I further say in my text-book:

"Post-syphilitic leucoplasia is important chiefly from the fact that, while its dependence upon syphilis usually is recognized, the mistake is made of believing that the lesions should be quite as tractable under anti-syphilitic treatment as other lesions of the mucus membranes occurring in this disease. These lesions, however, should be regarded as essentially non-syphilitic neoplasms occurring upon a syphilitic foundation. With this in mind the practitioner may readily comprehend the correct principles of treatment. Forgetting this, he is likely to do the patient incalculable injury through misguided and enthusiastic efforts to cure the lesions by strictly anti-syphilitic treatment. Ordinary local treatment simply aggravates the difficulty, as a rule, and only the most radical measures are likely to be effective. An additional reason for regarding these lesions as important, *per se*, is the indubitable fact that they may assume a malignant character.

According to Hulke,²⁴ ichthyosis—i.e., leucoplasia—of the tongue consists essentially in "hypertrophy of the epithelial and papillary elements of the mucous membrane." The relation of this condition of the tongue to syphilis and cancer is very important. All authorities unite in acknowledging its relations to syphilis—although it may occur in non-syphilitics. That the condition is prone to develop epithelial cancer, Weir²⁵ long ago showed most conclusively by the history of 68 cases, of which number 35 eventually developed epithelioma.

The condition underlying leucoplasia does not always develop distinct white plaques of hyperplastic epithelium. Some local perversion of nutrition may develop fissures of greater or less depth

and extent, with margins of hyperplastic epithelium, or the edges of which may have become transformed by atrophy, presenting a smooth, glazed, and dry appearance, the characteristic papillated appearance of the tongue being replaced by a smooth quasi-mucus surface. In other instances, distinct ridges of greater or less extent present themselves, particularly along the tongue or the inner surface of the buccal mucus membrane at the point of contact of the tongue and cheek with the teeth. This form of epithelial hyperplasia is especially likely to occur in patients overtreated with mercury. We find in other instances the classic type of leucoplasia formation in which more or or less elevated, distinct, whitish plaques of degen-

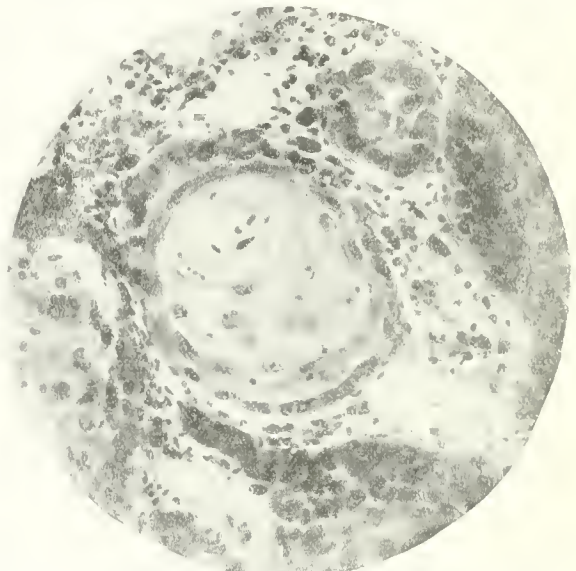


Fig. 6. Epithelial nests from epithelioma following gumma leucoplasia of tongue removed in Case 6., Showing advanced hyaline degeneration and characteristic "pearls." (X 275)

erated epithelial overgrowth are noted. These plaques may undergo transformation, and present the smooth, reddened, glazed appearance already described in connection with fissures. When the epithelium is transformed in this manner, lesions that are trivial in appearance are the seat of considerable irritation and pain. Excessive smokers, especially, are liable to such lesions.

The more formidable variety of post-syphilitic neoplasm occurs in the form of distinct, circumscribed nodules of greater or less extent, that have a tendency to develop along the margins of the tongue, but are often seen upon one or the other side of the lingual raphe, in some instances limiting themselves entirely to the base of the tongue on one or both sides (Figs. 5-7). These lesions are very likely to be mistaken for simple gummata. Doubtless nodular gummy infiltration is the point of departure for the lesion in some instances, but

²⁴ Clinical Society Reports, vol. XI, p. 1.

²⁵ N. Y. Med. Jour., Mar. 18, 1875.

instead of resolution, suppuration, or necrosis occurring, the gummy deposit apparently is removed or transformed—at least replaced by connective tissue new growth. This may subside to a certain extent, but is very likely to remain permanently and enlarge from time to time, each successive exacerbation being followed by an increase of permanent enlargement. Such nodules are to be regarded as extremely dangerous, as it is this form of post-syphilitic mucus lesion that is most likely to undergo malignant transformation (Figs. 5-7).

Even a superficial study of these lesions should convince the practical clinician that it is but a step between these benign epithelial and connective tissue overgrowths and malignant neoplasm. The nodular variety of the affection especially should be regarded as essentially pre-cancerous. In this view alone lies the safety of the patient.

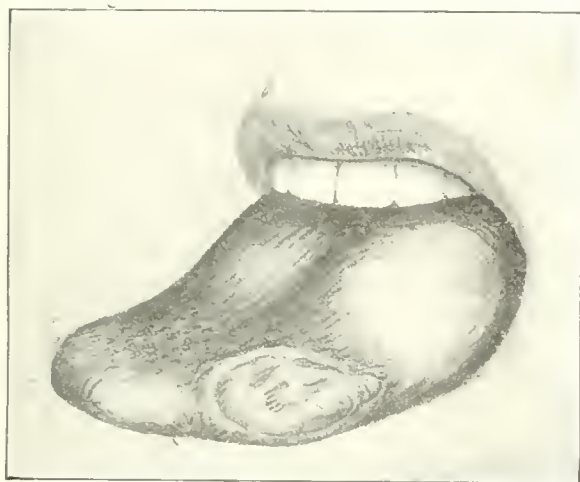


Fig. 7. Epithelioma following chronic glossitis—with resultant macroglossia—an epithelioma in advanced syphilis (Case III). Showing indurated malignant nodule and areas of leucoplakia. (From sketch by the author.)

In the treatment of leucoplakia and other pre-cancerous states of the mucous membrane, several factors must be taken into consideration, viz :

1. The possible existence of a certain degree of activity of the original constitutional trouble—syphilis.

2. The question whether syphilis *per se* is not long since been eradicated, as a consequence of which anti-syphilitic treatment will simply add fuel to the fire.

3. The relation of previous anti-syphilitic treatment—particularly in the direction of overdosing with mercury—to lesions present.

4. The existence of trophoneurosis²⁶ due to syphilis, treatment, idiosyncrasy, or all combined.

²⁶ Vide the author's paper on Trophoneurosis in its relations to the Phenomena of Syphilis. Trans. Southern Surg. and Gynec. Assoc., 1890. Also his text book, 1899, and report of case of cranial and spinal syphilis, N. Y. Med. Rec., 1914.

5. The relation, as etiologic factors, of local irritants, such as tobacco, liquor, highly seasoned food, and the application of caustics.

6. And, most important of all, the circumstance that the lesion may require attention as a neoplastic entity independently of its relation to any of the foregoing factors, with the distinct object in mind of preventing transformation into malignant disease.

Apropos of transition epithelioma, Friend, in Senn's classical work on tumors (1895), reports three cases of lupus vulgaris of the face which finally underwent transformation into epithelioma. As Friend expresses it: "The lupus furnished the *locus minoris resistentiae* for the malignant devel-



Fig. 8.

opment." I would go even further and state that the lupus probably acted directly by vitiating the nutrition of the epithelial cells and stimulating them—or rather, perhaps, removing the normal nutritive inhibition—to rapid multiplication. The result of rapid proliferation of degraded cells is too familiar to require special comment. The analogy of syphilis and lupus requires no special comment.

Various other authors have admitted the etiologic relation of syphilis to cancer through the medium of "leucoplakia." Kaposi, Lang, Neumann, and Grünfeld especially have directed attention to it. Following Barthelemy, a number of authorities, of whom Hutchinson is the most prominent, have asserted that syphilis predisposes to tubercle in early life and to cancer in later life.

It is noteworthy that syphilis was at one time supposed to be, to a certain extent, antagonistic to carcinoma. This fallacy, however, with increasing

accuracy of clinical and pathological knowledge, has given way to the generally accepted belief that syphilis in a measure predisposes to cancer, merely by disturbing nutrition. Experienced observers have recognized a special factor in syphilis which tends to develop cancer and to localize it in the site of syphilitic lesions and syphilitic cicatrices.

At this point I desire to make clear my own position as to the "transition" or "metamorphosis" of syphiloma into carcinoma. I regard the syphilomatous tissue as merely a nutritionally perverted matrix in which the carcinoma develops. To my classes I have been wont to liken the process to the mechanical one of so-called petrification of organic matter, in which cells and fibers are gradually replaced by calcific or silicious deposit. The direct excitant producing, first, syphilitic; and, second, malignant change, is a matter of indifference. All that is necessary is that there shall be an excitant.

In a masterly paper read before the Chicago Laryngological and Otological Society, Charles M. Robertson²⁷ reported four most interesting cases, three of carcinoma and one of sarcoma of the throat, developing into syphilitic cicatrices. The author concludes as follows: "Tumors of such character are probably due to some continued irritation, either in the form of physiological or chemical agents or gunnatus areas, which are, by reason of their position, most exposed. There is a causative feature also in the altered nutrition of the part in which embryonic cell proliferation is stimulated."

"We all must agree that malignant growths may and often do succeed syphilitic lesions, especially in the tongue and throat, and for this reason the prognosis of syphilitic gumma should be guarded. In latent syphilis the anti-syphilitic treatment should be continued with the thought that its administration is prophylactic to malignant growths. In addition to specific treatment, it is essential to remove all sources of irritation in the way of stimulation, traumatisms, the correction of irregular teeth, and the prohibition of the use of alcohol and tobacco. We should be on the lookout for these complications of syphilis, and should they occur, our duty is plain in surgical intervention at as early a date as possible, for even at the most favorable time we are unable to make a favorable prognosis."

It is especially important to remember that, in a measure, irritation bears the same relation to syphilitic lesions that it does to malignant processes. In the presence of constitutional syphilis on the one hand, or of cancer predisposition upon the other, a

lesion develops. When syphilis and cancer predisposition are combined, local irritation is doubly dangerous.

In my paper of 1889²⁸ and in my text-book²⁹ in 1899, I wrote as follows *in re* the relation of cancer and syphilis:

"In recognizing the transformation of syphilitic processes into cancer, the author does not claim that the histologic elements of syphilis ever are transformed into those of cancer, but that the elements of syphilis having been removed, the tissues are left in such a damaged state that continued irritation may result in cancerous degeneration. On the other hand, a syphilitic process may recur so frequently, and be so obstinate to treatment, that the irritation thereby produced is capable of causing cancer.

"It is too soon to discuss the question of the existence of special bacilli in syphilis and in cancer to disprove the possibility of the transformation of the one into the other. It is conceivable that both cancerous and syphilitic deposits may act in the same manner as other irritating processes. If a cancer were present in the mouth of a syphilitic subject, syphilitic processes presumably would be more likely to develop in the vicinity of the malignant disease than elsewhere. A somewhat similar relation exists between an existing syphilitic lesion and the development of carcinoma. Whether or not actual transformation occurs, cancer may develop in tissues indubitably affected by syphilis, and cancer go on to destruction of tissue and finally prove fatal, and without any preliminary change in the physical appearance of the tissues affected by syphilis prior to the development of cancer.

"To put the matter of transformation of syphilis into cancer concisely, the author does not believe that syphilitic cells can possibly be transformed into cancer-cells, but holds that the irritation of the tissues produced by the former may, in the presence of favorable constitutional and local conditions, develop a new process of tissue-building or neoplastic deposit resulting in the formation of cancer-cells, merely from the changes excited in the epithelium."

Ribbert's theory is interesting. He holds that there is a peculiar relationship between the basement membrane and the underlying epithelial cells, which, if disturbed, leads to active proliferation of the latter, with resulting invasion of the deep structures and the development of malignancy.

It is probable that in some cases in which cancer and syphiloma are found in the mouth of the same

²⁷ Malignant Tumors of the Throat, etc., Jour. Ophthal. and Otol., November, 1910.

²⁸ Med. Rec., N. Y., Aug. 26, 1889.

²⁹ Genito-Urinary, Venereal and Sexual Diseases, 1899.

subject, the relation of the two diseases is purely coincidental. When, however, a carcinoma supervenes upon syphilitic lesion, or upon the scar of an antecedent lesion, it is safe to rule out coincidence. Leucoplasia predisposes to cancer irrespective of the cause of the process. Leucoplasia, after all, is really a hyper-keratosis of the mucosa, analogous to that occurring in the skin, there probably being in some cases merely a more definite chronic inflammatory character to the process than in the case of the integument.

Butlin³⁰ reports four cases of "leucoma" or "leucoplakia" of the vulva, the first complicated with an ulcer which probably was cancerous, and the other three with undoubted cancer: "The plaques formed only on the mucus surface, not on the skin, and in appearance, feel, and variety of form were precisely similar to the white plaques which form upon the mucus membrane of the mouth. In two instances the vulva and the mouth were attacked in the same patient. It seemed that the disease was identical in both situations, and if so the importance of tobacco and of the direct contact of alcohol as factors in the production of the disease have been overestimated. *There was no reason in any of these cases to suspect syphilis, either inherited or acquired.*³¹ Gout or rheumatism seemed to possibly be an etiological factor in these cases. The signs of inflammation were so little evident in sections of the leucoma of the vulva that the condition seemed more like a degeneration than an inflammation, or even the result of past inflammation. Since the altered surface evidently predisposes to the development of cancer, it would seem wise to freely remove all such plaques from the vulva, even if there are no signs of cancerous changes."

Butlin's cases obviously are inconclusive. I present them merely because of their suggestiveness. My italics indicate the diagnostic fallacy. The fact that the conditions found in the mouth and the vulva were the same is no argument against the etiologic importance of alcohol and tobacco in the case of leucoma of the mouth. It shows merely that irritation produces serious results in both localities.

I wish to remark in passing that not all white patches of the mucosa, and especially of the genitalia, are true leucoplasia. White areas occasionally are seen which are identical with leucoderma. In some instances this condition is teratological. I recall a case of a young woman the upper surface of whose tongue from birth suggested leucoplakia.

This never had given rise to any discomfort and, under the most rigid analysis, there was no suspicion of syphilis. I have observed many instances of patches of white or pinkish white follicles of the mucosa which were innocuous.

It is not only in the mouth that a distinct etiologic relation of syphilis to cancer is seen. In a case which fell under my observation—a man only 33 years of age—epithelioma supervened upon a typical Hunterian chancre in the fossa glandis. The chancre was followed by classical syphilis. The penile lesion did not heal, but underwent a "fungoid" transformation resembling simple papilloma. I finally excised the lesion, but the histologic diagnosis was unsatisfactory and as healing was prompt I did not suspect carcinoma. Three months later, however, the process recurred, and the microscope showed typical epithelioma. Operation was refused, the inguinal glands became involved, and the patient died several months later of repeated hemorrhages.

Schmidt's case³² is interesting in this connection.

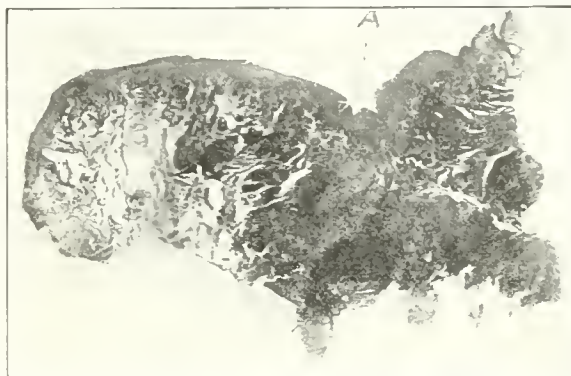


Fig. 9. Cross section of specimen of tongue removed in Case III.

The early age of my patient was an instructive feature of the case. The practitioner is too frequently misled by the comparative youth of some patients. The author recalls a lamentable case of rapidly fatal epithelioma of the lip in a man of 40, and another of the cervix in a woman of 24.

Either epithelioma or sarcoma may follow syphilitic lesions of the tongue, but in the cases in which sarcoma develops, it is my opinion that it most frequently will be found to have followed gumma—and especially where intercurrent attacks of glossitis have occurred—rather than leucoplasia, and that where leucoplasia pre-existed it was associated with gumma.

According to my observation, the progress of the syphilitic tongue toward malignancy often is marked by recurrent attacks of more or less acute diffuse glossitis. This may involve the tongue in part

³⁰ British Med. Jour., July 13, 1901.

³¹ Italics mine. G.F.L.

³² O. L. Schmidt: Case of Syphilitic Initial Lesion Followed by Epithelioma. Jour. Cut. Dis., N. Y., 1907.

or in its entirety. Each attack leaves the organ in a more susceptible condition, to both additional syphilitic lesions and to future complicating glossitis. The tongue may be increasingly and permanently more or less enlarged—macroglossia. Köenig³³ also has called attention to this point, attributing to attrition by the teeth the intercurrent attacks of glossitis producing the macroglossia.

Gumma of the tongue, especially, is prone to inflammatory complications. The sclerosis that follows glossitis is a condition which, in the presence of the special cancerous predisposition, particularly favors the development of malignancy.

The exciting causes of intercurrent glossitis in syphilis of the tongue comprise irritants of all kinds. The ill-advised use of caustics, septic infection, and mercury are the chief of these. Patients under the full influence of mercury always are on the verge of inflammations of the tissues and organs of the mouth.

Intercurrent glossitis in syphilis of the tongue may prove fatal, as shown by a case of my own.³⁴ A man of 37, suffering from chronic mucus patches and ulcers of the tongue, became infected by holding in his mouth for several hours while hunting some small rifle cartridges. Within 24 hours acute glossitis set in, the inflammation extending, 48 hours later, to the larynx and producing odema of the glottis. I finally performed a tracheotomy, but the operation proved to be merely palliative. Death occurred from exhaustion 12 hours later. Whatever chance for his life this patient might have had was lost through a "conservative" consultant who refused to permit early free incisions to be made in the tongue.

In the differential diagnosis of lesions of the tongue, the value of the microscope often consists chiefly in confirming the clinical diagnosis after it is too late to accomplish much by operation. Where a superficial neoplasm or ulcer matures early, the diagnosis may be made comparatively early by the microscope, but such lesions should not be allowed to progress to a mature condition. They would better be removed as soon as they are proved to be resistant to ordinary measures of treatment.

The rapid course of carcinoma of the tongue is in itself suggestive of the danger of waiting for a microscopic diagnosis in cases which clinically seem to warrant operation. The large majority of the unoperated die within twelve months. Unoperated cases differ only as to the time of death. They all die.

As to the Wassermann test, it frequently is fallacious. Syphilis of the mouth and tongue often leads to cancer, and in such cases a positive Wassermann merely shows that the patient is still syphilitic—actively so. A positive Wassermann in doubtful cases warrants thorough anti-syphilitic treatment—indeed, a negative does not contraindicate it—but if the response is not prompt, operation is indicated. It indicates also the continuation of treatment after operation, even in indubitable cancer.

In cases in which carcinoma develops in a syphilitic, with no relation of the one disease to the other—*e.g.*, in a carcinoma developing in a recent syphilitic—or in which syphilis is contracted by a carcinomatous subject, the Wassermann may be especially misleading. Examples of both these sources of confusion are met with.

And there is another side to the story: The fact that the Wassermann test is unreliable in certain special conditions in no wise proves that the test should be relegated to the limbo of the forgotten. A few months since I heard a distinguished professor of surgery publicly condemn the Wassermann as worthless, because, forsooth, he had operated upon, first, a brain tumor, in which there had been three positive Wassermans, and found the tumor to be a glioma; second, upon an ulcerated tumor of the tongue in which there had been several Wassermans, but which proved to be carcinoma. As to how he arrived at the conclusion that glioma or carcinoma should insure against the existence of syphilis, the distinguished surgeon did not state. His experience proved, not that the Wassermann was worthless, but merely that the test was an unsafe guide in the cases mentioned, simply because syphilis co-existed respectfully with glioma and carcinoma. He overlooked the possible etiologic relation of syphilis to the carcinoma of the tongue.

If the promptness with which epithelioma of the tongue invades the neighboring lymphatics were more generally understood, operation on the average would not be so long delayed. The time is past for the "simple infection and inflammation" explanation of lymphatic enlargements beneath the jaw in suspicious lesions of the tongue.

In passing, it may be well to remind the general practitioner that adenopathy in suspicious chronic lesions of the tongue is in general evidence against syphilis and in favor of malignancy, if chancre can be excluded. The lesions of late syphilis are not attended by adenopathy, save when mixed infection is superadded, as is sometimes the case if the tongue lesion be irritated, by caustics or otherwise.

³³ Lehr. der Spec. Chir., 1878.

³⁴ Acute Septic Glossitis, followed by Oedema Glottidis, Western Med. Reporter, January, 1885.

The fallacy of attempts at the removal of stubborn syphilitic lesions by internal medication or by caustics should at once be obvious, but, unfortunately, the profession at large has not yet learned its lesson, much to the detriment of surgery and at great cost to the laity. Possibly if the profession, in certain conditions, regarded minor operations on the tongue as the best prophylaxis of malignant disease, many valuable lives might be saved. The careful early excision of leucoplasic areas and stubborn gummata is the keynote of tongue cancer surgery. A comparatively trivial operation oftentimes will save life.

Apropos of "pre-cancerous" lesions of the mouth, tongue and throat in general, the best time to operate upon cancer is when doctors are differing as to the nature of the lesion. The older members of the profession will recall the differences of learned opinion in the cases of General Grant and the Emperor Frederick. The outcome of these cases was merely that which is usual in such diagnostic controversies.

Extirpated doubtful lesions are the most praiseworthy kind, especially when, as usually is the case, the patient is entitled to the benefit of the doubt. Allowing patients to die without a rational attempt to save life whilst waiting for a microscopic diagnosis of malignancy, which diagnosis may lie in the realm of impossibilities, possibly may be ultra-scientific, but it certainly also is ultra-foolish.

Butlin's personal statistics,³⁵ especially, give evidence of the safety of operations upon the tongue. In one of his earlier papers he recounts 46 cases of removal of one-half or the whole of the organ, with but one fatal result. As for the minor resections, they are practically absolutely safe.

Later, Butlin³⁶ further cites Whitehead³⁷ with 139, Kocher³⁸ 59, Krönlein³⁹ 33, and himself⁴⁰ with 102 cases of operation, 333 in all, showing 12½ per cent. of mortality, which is reduced to 7 per cent. for the uncomplicated and raised to 25 per cent. for the more seriously complicated operations.

The post-operative results in the foregoing cases showed that 20 per cent. were alive and well or died of other diseases more than three years after operation, a number of others being alive and well from one to three years after operation, but not to be counted as cures until the generally accepted cancer "recurrence limit" of three years had been reached.

Cases alive many years after operation are reported by numerous authors. Jonathan Hutchinson⁴¹ reports a number as living at the end of 8 or 10 years and one 19 years. Buchanan,⁴² one living 30 years; Heath,⁴³ one 23 years and one 15 years; Spencer,⁴⁴ one 12 years; Stonham,⁴⁵ one 13 years; Whitehead,⁴⁶ one 14 years; Wheeler,⁴⁷ one 15 years; Kronlein,⁴⁸ one 12 years; and Butlin,⁴⁹ one 13 years.

Although the lapse of years after operation is increasingly suggestive of a permanent cure, recurrence after a long period of time occur sufficiently often to warn us against too great optimism. Thus Pean⁵⁰ reports a case of recurrence after 15 years

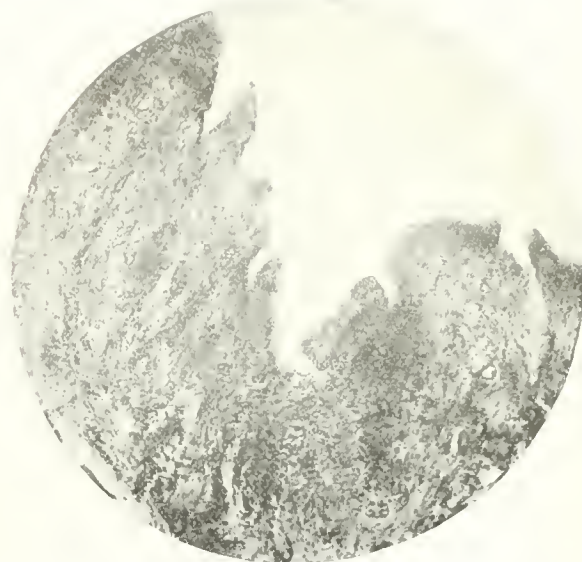


Fig. 10. Epithelioma of tongue in late syphilis. Showing superficial necrotic area with chronic inflammatory infiltration beneath it, of specimen removed in Case III. No evidence of malignancy. (X 53)

Kocher,⁵¹ one after 10 and another after 12 years; and Crerar,⁵² one after 6 years.

Contrasting the results of non-interference with the average prolongation of life by operation, even an occasional error in diagnosis followed by operation would not weigh much in the balance of life saving.

The fact that lymphatic invasion occurs early emphasizes the advisability of cleaning out the tissues beneath the jaw as a systematic procedure in operating upon the tongue for malignant disease, whether perceptible gland involvement exists or not.

⁴¹ Arch. Surg., 1898, and Clin. Jour., 1892-3.

⁴² Edin. Med. Jour., 1894-5.

⁴³ Lancet, 1899, and Trans. Path. Soc., 1876.

⁴⁴ Quoted by Butlin.

⁴⁵ Trans. Clin. Soc. Lond., 1886.

⁴⁶ Lancet, 1888 and 1891.

⁴⁷ J. Amer. Med. Ass., 1877.

⁴⁸ Binder: Beitr. z. Klin. Chir., 1896.

⁴⁹ Dis. of the Tongue.

⁵⁰ Le. u. d. Chir. Clin., 1892.

⁵¹ Sachs: Arch. f. Klin. Chir., 1893.

⁵² Brit. Med. Jour., 1885.

³⁵ Brit. Med. Jour., Apr. 14, 1894.

³⁶ Dis. of Tongue.

³⁷ Lancet, vol. I, 1891.

³⁸ Sachs: Langenbeck's Arch., vol. XLV, 1893.

³⁹ Beiträge z. Klin. Chir., vol. XVII, 1896.

⁴⁰ Brit. Med. Jour., vol. I, 1898.

The abundant lymphatic supply of the sublingual and submaxillary salivary glands should at once suggest their routine removal because of their being an especially dangerous source of recurrence.

It is not my intention here to enter into the merits of the various standard operations for lesions of the tongue. My own custom is:

1. To give the patient, by operation, the benefit of reasonable doubt, where a microscopically "benign" lesion grows progressively worse despite proper treatment.

2. To resect with knife or scissors all "pre-cancerous" or obstinate and suspicious lesions, especially post-gummatous sclerosis and leucoplakia.

3. To remove half the tongue when it is reasonably certain that a given lesion of the organ is malignant and the case is seen early enough to warrant a limited operation.

4. To remove the entire tongue in more advanced cases.

5. To clean out the tissue beneath the jaw, including the salivary glands, on one side in the limited, and on both sides in the advanced cases.

The galvano-cautery loop, the ecraseur, and the Kocher operation all have their range of applicability. The preliminary ligation of the lingual or ranine arteries is not always necessary. A rapid and safe operation can be done from within the mouth by using forceps in a fashion similar to that employed in vaginal hysterectomy, the forceps being allowed to remain in situ for from 24 to 48 hours. Rapid operation sometimes is very essential. In many cases the patient is greatly debilitated from the following factors:

1. Lack of proper alimentation.
2. Digestive disturbance.
3. Hemorrhage.
4. Pain and lack of sleep.
5. Depression incidental to a knowledge of the true condition.
6. Sepsis.
7. Most important of all, the untoward effects of vigorous anti-syphilitic treatment.

Such favorable results as have been recorded in early cases are not to be expected in advanced cases, merely because of the conditions mentioned in the foregoing.

In presenting cases illustrative of the subject discussed in this paper, I have selected merely a few of a typic character, illustrating:

1. The importance of syphilis as an etiologic factor in malignant disease of the tongue.
2. The difficulties of diagnosis.

3. The fallibility of microscopic study of the lesions prior to complete operation.

4. The advisability of radical treatment, by surgical measures, of all obstinate syphilitic lesions of the mouth and especially of the tongue.

5. The importance of early operation in suspicious lesions.

6. The wisdom, in many cases, of relying on the clinical aspect of the case, irrespective of the results of the Wassermann, or of the microscopic study of the lesions prior to complete removal.

CASE 1: *Sarcoma of the tongue, following syphilis.*⁶³

A man 29 years of age. Gambler. Good family history. Contracted syphilis at the age of 18. Secondary symptoms appeared about four months after the initial lesion, a pronounced papulo-pustular eruption appearing and resulting in considerable scarring of the skin. Multiple mucus patches developed and were very annoying, especially those upon the tongue. A thorough course of mercury was given for three months, after which he went to the Hot Springs, where for three months he was rubbed with an enormous amount of mercury, and twice badly salivated. Two months later eruptions again appeared upon the body, with larger mucus patches than before, the tongue giving considerable trouble, evidently from glossitis. A troublesome old eczema of the hands now developed. He returned to the Springs and remained there for eleven weeks, taking large doses of mercury internally. He returned home and was apparently well for three months, when mucus patches and eruptions appeared, "sores" now appearing on the penis.

Five years after the beginning of the syphilis the patient fell under care of a physician who for six months again freely rubbed him with mercury. He improved for a time and then quiet treatment, but, later, growing worse, returned to the same physician and for at least eighteen months took mercury freely.

A year later—eight years after contracting the disease—the patient consulted me for the first time. He then had unequivocal cerebral syphilis—pachymeningitis—and tuberculo-squamous syphilides upon the forehead, forearms, and legs; the tibiae and sternum were excessively tender, with osteocopic pains. Cephalalgia was constant and intense. A gummy ulcer with several fissures existed upon the penis just back of the corona.

The tongue was rough and coated with a thick, dirty, yellowish-gray fur, with marked dryness in the center and anterior part of the organ. The tongue showed several sclero-gumous nodules, one in the center of the organ and the others near its base. The lesions resembled those shown in figure 5. The patient admitted that the tobacco and alcohol habits had been persisted in for a great portion of the time that he had been under treat-

⁶³ Malignant Transformation of Syphiloma of the Tongue. Amputation of Tongue by Galvano-Cautery. Reported in N. Y. Med. Record, Oct. 26, 1889, and in the author's text book on Genito-Urinary, Venereal and Sexual Diseases, 1899, pp. 442-5.

ment, and, strange to say, stated that his physicians had not restricted him in his indulgences.

Treatment was now very vigorous. Codliver-oil and iron were ordered on account of marked debility. The mixed treatment and potassic iodid in saturated solution were given, the dose of iodid being rapidly increased to 300 grains per diem, and continued for three weeks with no results until the end of that time. Local applications of acid nitrate of mercury were made to the tongue from time to time, with apparent benefit. When the symptoms improved iodid was diminished to 60 grains per day, the tonics being continued.

At the end of three months the patient was free from trouble, save that his tongue was more markedly psoriatic than ever, the nodules upon its surface being still perceptible. This condition never disappeared entirely.

The case remained comparatively well for some months, the tongue creating some uneasiness from time to time on account of commencing ulceration of the nodules, which at first rapidly yielded to treatment. Finally, however, the nodules and furring of the tongue became more prominent, and remained so in spite of treatment, and furring becoming a sort of membranous deposit like wet chamois-leather, that reformed as fast as it was removed. The patient now again went to Hot Springs.

A short time later, while the patient was at the Springs, under the care of the late Dr. S. S. Vaughn, the tongue swelled considerably, the nodules began to ulcerate, and at one time a severe hemorrhage occurred.

After all means of treatment had been tried for two months without avail, the case was pronounced probably cancerous and Dr. Vaughn referred the case to the author for excision.

Upon examination the tongue was found filling the mouth and pressing upon the teeth in such a manner that it had become eroded and ulcerated by them—subacute diffuse glossitis. Salivation was profuse; a deep sloughy ulcer existed at the center and back part of the organ. There were no other lesions on any part of the body. Several microscopic examinations failed to demonstrate malignancy.

As the patient experienced great difficulty in masticating and swallowing, he was subsisting entirely upon fluid food, and not being primarily very robust, had become emaciated. The treatment instituted was chiefly tonic and supportive, in conjunction with sodium iodid. Local applications were made of a compound of carbolic acid, iodin, and menthol in mild strength.

Improvement at first was rapid and within a week the tongue was reduced to nearly its normal size. In a few days, however, it again suddenly enlarged—acute diffuse glossitis—upon the right side, being at least double the thickness upon the right side that it was upon the left. This condition soon subsided, but was succeeded by enlargement of the nodules previously mentioned, several new nodules appearing on the upper surface of the tongue.

Within a few days the left side of the tongue

underwent a similar diffuse enlargement, which also subsided and was succeeded by the development of nodules. The whole tongue now became so swollen that it hung over the edges of the teeth, protruding through the spaces left by extracted teeth. There was little or no pain and such as there was was referred by the patient to the "holes" worn in the tongue by the teeth. Speech was so impaired that the patient resorted to sign language.

The case went on from bad to worse—many different plans of treatment being tried without avail. Sloughing began and continued until the tongue was in such a condition that even if healing had been possible the organ would have been practically useless. The base of the tongue was a foul mass of hyperplastic ulcerating tissue, the odor and secretion of which were not only offensive to the patient and others, but also prominent factors in producing the constitutional disturbance.

There seemed to be no hope of benefit from

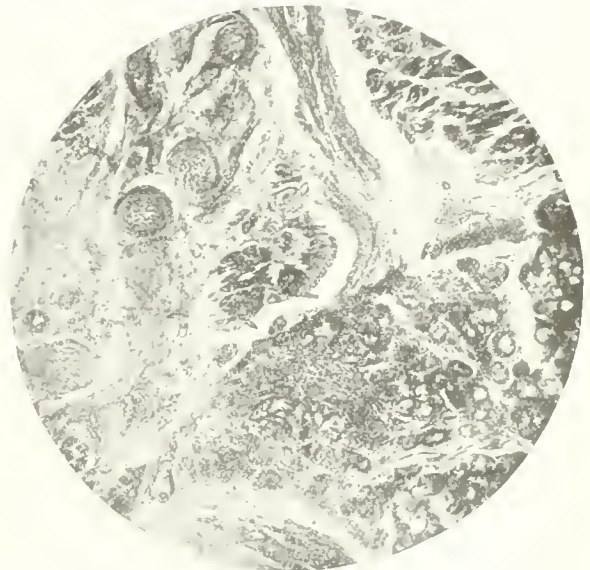


Fig. 11. Showing deeper area of specimen in Case III. No evidence of malignancy. (X 53)

treatment and the malignancy of the process appeared to be now clinically established, although microscopic evidence was wanting. As the patient was anxious to have something done to remove the foul and stinking mass from his mouth, I performed complete excision with the galvano-cautery.

At the end of a week the eschar produced by the cauterization became detached, without hemorrhage, and left a fairly healthy surface; the fetor of the breath was gone, and the sloughing at the base of the tongue had ceased. The floor of the mouth healed nicely and remained in a tolerably healthy condition for several weeks. The general condition of the patient improved considerably and he could talk surprisingly well.

The late Dr. I. N. Danforth examined the excised specimen and pronounced it of a "sarcomatous character," but atypic.

About a month after the operation the submaxillary glands and retro-maxillary glands became en-

larged and quite tender. There was a moderate degree of cephalalgia and otalgia. The ulcerative process on the floor of the mouth recurred, but did not progress rapidly nor ulcerate extensively. A small ulcer formed upon the right pillar of the fauces. These symptoms practically settled the question of malignancy. Two months later an abscess formed in the submaxillary lymphatic glands. This, when opened, gave exit to a thin, sanious fluid. Pain was now very severe. At the end of three months occasional hemorrhages from the mouth began. The patient finally died, four months after the operation and four years from the time he first consulted me, from a sudden hemorrhage—probably from the internal carotid—during the night.

This unfortunate case is interesting in many respects. During its course there developed distinctive features of several forms of glossal pathology. During the period that the patient was under my observation, the tongue presented gummy nodules and ulceration, lingual psoriasis—leucoplasia—diffuse syphilitomatous deposit, and recurrent attacks of glossitis. Until sloughing began it resembled Case II (Fig. 5). At various times before coming under observation, and probably once afterward, as shown by the history, mercurial stomatitis occurred and formed an important feature of the case, particularly as regards the etiology of the process that finally necessitated removal of the tongue. Prior to extensive destruction of the organ, these various conditions merged into a general hyperplasia, followed by sclerosis, the tongue being extremely indurated. What little chance this patient may have had for recovery, or even for a considerable prolongation of life, obviously was lost through failure to recognize early and remove the pre-cancerous lesions. To the author, the lesions taught by the case proved invaluable.

CASE II: A man 63 years of age. Speculator. One maternal uncle died of cancer. The case had been under my observation for more than thirty years. When I first saw him he was suffering from tertiary syphilis with varied but typical manifestation. Obstinate mucus patches of the mouth, tongue and throat were most annoying. He had been a heavy smoker, but he did not drink. The surface of the tongue was congenitally malformed (Fig. 1). The patient was negligent and treatment spasmodic during my observation of the case.

Some twenty years before the finale, leucoplakic areas, fissures, and gunmata developed on the tongue. These yielded to treatment or were excised. Seven years before the tongue lesions developed malignancy, I removed the patient's lip for epithelioma, cleaning out the tissues beneath the jaw on the left side, corresponding to the lesion, and submentally across to the opposite side. There was no adenopathy. The submaxillary and sublingual salivary glands were removed. At the same

time I removed a huge lipoma from the neck and interscapular region, operation upon which hitherto had been obstinately refused.

The epithelioma of the lip appeared *denovo*; there had been no preceding labial lesion, syphilitic or other. The patient had stopped smoking some years before the epithelioma appeared on the lip. Cancer predisposition undoubtedly underlay this case.

Recovery was prompt and there was no recurrence of the epithelioma. The patient finally sought other advice for his tongue, which had grown steadily worse from lesion development and intercurrent glossitis. He returned to me, however, at the end of a year—about October 1, 1913. The appearance of the tongue at this time is shown in figure 5. In a general way, the macroscopic appearance was not unlike that of Case I, in its advanced stages.

Anti-syphilitic treatment, and especially potassic iodid, had been carried to the maximum, with steady change for the worse. Anemia and debility from lack of proper nourishment and the effect of drugs was marked. Repeated microscopic examinations failed to show malignancy and the Wassermann was distinctly positive.

I put the case upon tonics and administered salvarsan three times within eight weeks, with no result. Meanwhile several necrotic areas appeared upon the tongue. The glands beneath the jaw were not enlarged. Although the microscopic report still was negative, a diagnosis of malignancy now was made and operation proposed and consented to. I performed a Kocher operation December 30, 1913, with a preliminary ligation of the lingual arteries and cleaning out of the submaxillary spaces. The patient did not react and died of shock 24 hours after operation. Should I operate another case of a similar nature, I should either proceed by two stages: first, cleaning out the tissues beneath the jaw and ligating the linguals, and removing the tongue later, after recovery from the effects of the first operation, or do a rapid excision from within the mouth. The shock of a complete operation is too severe where the general condition is as bad as it was in this case.⁵⁴

The microscopic examination of sections taken from the deeper portion of the removed organ showed typical epithelioma. Figure 6 beautifully shows a series of epithelial nests from one of these sections.

CASE III: *Epithelioma of the tongue following leucoplasia buccalis, labialis et lingualis.*

A man 53 years of age, merchant, no history of cancerous heredity, with a more or less obscure history of lues thirty years before, consulted me for leucoplastic lesions of the oral cavity. The tongue, lower lip, and inside of the left cheek presented incipient but typical leucoplastic areas.

There was a moderate diffuse chronic glossitis. The patient was a very excessive smoker and a so-called temperate drinker. Wassermann was positive. The patient was advised of the dangers of the condition and specific treatment was given, with

⁵⁴ I note that Butlin favors the "two stage" plan—with a fortnight interim—in complicated cases.

the understanding that, if the condition did not promptly improve, the involved areas were to be excised. Special emphasis was laid upon the danger of the development of malignant disease.

Unfortunately, as the sequence proved, improvement occurred, and the patient consequently minimized the importance of the warning and advice given him. He also, I suspect, rebelled against the proscription of alcoholics and tobacco and finally changed medical advisers. A year and a half later he again consulted me for an indurated ulcer upon the left margin of the tongue, at about the junction of the anterior with the middle third of the organ. There also were several areas of leucoplakia (Fig. 7). There was no glandular involvement.

The ulcer had begun developing several months after I last saw the case and had been most persistently and thoroughly treated with mercury and iodid for gumma, which it resembled sufficiently to account of the error usually committed in such cases.

Despite the negative microscopic evidence and the known existence of lues, I regarded the lesion as either malignant, or at least "pre-cancerous," and advised resection of the tongue. To satisfy the patient, incidentally to strengthen my position regarding the diagnosis, I administered two doses of salvarsan and a four weeks' intramuscular course of mercury salicylate. Conditions growing worse instead of better, I advised immediate operation, which was consented to.

August 4, 1913, I removed the left half of the tongue intraorally by ecraseur and scissors and cleaned out the submaxillary region from the right of the middle line in front, back to the posterior maxillary space, including the corresponding submaxillary and sublingual salivary glands. A little more than one-half inch of the remaining portion of the tip of the tongue also was excised. There was but one bleeding point—the left ranine artery—which was troublesome. This was caught with forceps and the instrument left *in situ* for 36 hours.

Healing of both wounds was prompt, as is usual in such cases, and at present writing, seventeen months after the operation, the patient is perfectly well. Figure 8 shows the appearance of the healed remaining portion of the tongue. Speech is but slightly impaired.

Several leucoplastic areas on the lip and cheek have been excised at various intervals since the removal of the tongue, none having been apparent for some months. Anti-syphilitic treatment has been intermittently continued.

Figure 9 shows the macroscopic appearance of a cross section of the removed portion of the tongue. At A is seen the area of destruction.

Figures 10-11-12 show the microscopic characters of the specimen. It will be seen that in the superficial section (Fig. 10) there are no evidences of malignant change. The same is true of figure 11, which was taken from about the center of the specimen.

Figure 12, however, which was taken from the deepest part of the specimen, shows typic epithe-

lioma. It is important to note also that the younger nests are those farthest removed from the bottom of the section, the evidences of hyaline degeneration, i.e., the characteristic "pearls," being located below. This probably is explicable by a metastasis via the lymphatics, the perverted cells lodging in the deeper portion of the tissue and extending upward by contiguity in the direction from which they came.

It would be difficult to present a case which would more lucidly show the fallacy of relying entirely upon the microscope for an ante-operative diagnosis of a suspicious lesion of the tongue. It also will be noted that the Wassermann test in such cases would be likely to be misleading, rather than helpful.

The prospect for a permanent cure is at least

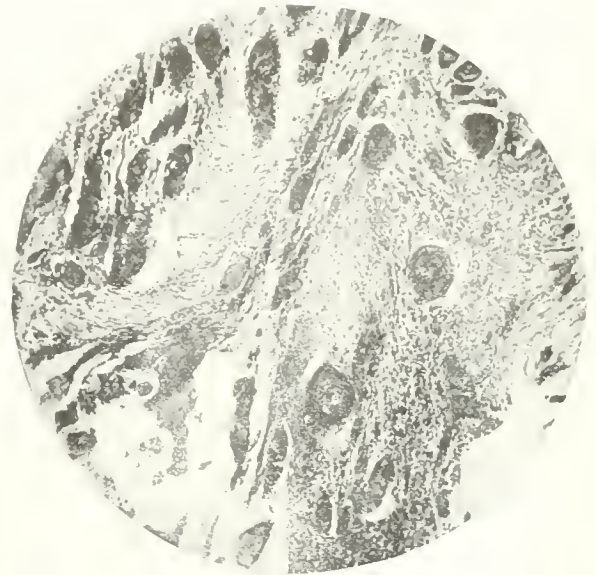


Fig. 12. Section from deepest part of specimen removed from Case III. Showing various stages of epithelial proliferation and degeneration, hyaline degeneration being advanced, and epithelial nests characteristic, in direct ratio to distance from the periphery of the affected portion of the tongue. (X 56)

hopeful in this case, thanks to the clinical diagnosis alone.

CASE IV: Seen in consultation. A man of 45, merchant, with good family history, had been for about four years under the care of a very competent surgeon for indubitable syphilis. During this time lesions of the tongue had been very annoying. For two years the patient had been under constant treatment for "gumma" of the tongue. During this time he had on several occasions been seen in consultation by a very eminent and experienced surgeon and teacher. Specific medication had been given *ad max.* with appropriate local measures, but the case grew progressively worse. There was moderate macroglossia with a number of nodules, some of which were sloughing, and a necrotic area of considerable size on the upper surface of the tongue. The breath had the fetor usual to such conditions. There was no adenopathy. The patient was distinctly cachectic and suffering from unilateral otalgia, chiefly at night. I promptly made

a diagnosis of carcinoma. "It cannot possibly be carcinoma," said his physician. "Why, we have had eleven microscopic examinations of the tissue and all were negative."

"Just the same," I replied, "it is carcinoma. Sloughing has begun and at any moment may lead to serious hemorrhage and an emergency operation. I should advise immediate removal of the tongue."

Later I met the consultant, who made the same comment on my diagnosis, including the enumeration of the microscopic examinations and their results. I still insisted that my diagnosis was correct. The patient declined operation and immediately went to New York and consulted the late Dr. William T. Bull, who, I believe, confirmed my diagnosis. Operation still was refused and the patient returned to his home in Ohio.

Within a week after I saw the case, an uncontrollable hemorrhage occurred and the consultant to whom I have referred was compelled to perform an emergency operation. The patient died from renal complications on the eleventh day.

The physician in charge reported that microscopic examination of deep sections of the tongue specimen showed typic malignancy, the case probably being histologically similar to Case III (Figs. 9, 10, 11, 12), which readily explains the error in the early diagnosis.

CASE V: A woman 48 years of age—a prostitute—appeared at my clinic with tertiary squamæ—"psoriasis"—of the palms and soles, a "tubercular" syphilide of the face and chronic mucus patches and ulcers of the tongue. Family history free from cancer. The patient smoked cigarettes inordinately and indulged in liquor to excess. Treatment having given relief, the case passed from under observation. Two years later she consulted me for lingual leucoplasia and a small, indurated, circular, ulcerating plaque about 15 mm. in diameter on the tip of the tongue. There was no adenopathy. The microscope showed typic malignancy (epithelioma) and an advanced superficial sclerosis and keratosis (Figs. 4-13). Operation was advised and consented to. A little more than an inch of the anterior portion of the tongue was removed and the leucoplastic areas excised. The submaxillary spaces were not cleaned out, because of the patient's opposition to remaining in hospital. Healing was prompt and, while the case remained under my observation, a period of some ten months, there was no recurrence. At this time speech was but slightly impaired. I do not know the final outcome of the case, as the patient drifted away and, I believe, left the city.

The advanced stage of hyaline degeneration and absence of adenopathy and the small size of the malignant lesion are noteworthy.

Malignancy following syphilitic leucoplasia is by no means limited to the tongue. The author has had two cases of epithelioma of the cheek, one of which involved the floor of the mouth and gums, and several of epithelioma of the lip, in syphilitics, which were preceded by leucoplasia. The first men-

tioned of these cases was peculiarly distressing to me, as the patient was an intimate friend who had been under observation and careful supervision for twenty-five years or more. Temperate in other things, he was an excessive smoker. Ten years before the fatal ending, I warned him of the dangers incidental to a rather diffuse leucoplastic area on the buccal mucus membrane at the angle of the mouth, suggested removal of the affected tissue, and also endeavored without success to induce him to cease smoking.

It has been my experience that in these cases, as well as in those in which the tongue is involved, with reformation of the patient's health and careful excision of the leucoplastic areas as fast as they appear, the mouth can be put in a safe condition and will so remain in a large proportion of cases.

CASE VI: A man 50 years of age, architect, was referred to me for what his physician termed an obstinate "syphilitic mucus ulcer" of the left border of the tongue, posteriorly. Family history negative as to cancer. The history of syphilis was clear and there were several characteristic ancient nodes—osteo-hyperplasia—upon the tibiae. There was a marked internal strabismus of the right eye, from third nerve involvement, which had developed one year before I saw the case. The tongue presented several nodules which, the patient stated, had appeared and disappeared from time to time, for several years. There was slight macroglossia and numerous leucoplastic areas. The ulcer was about 2 cm. in diameter, with indurated borders. Pain in the left ear had developed about four weeks previously. Patient was a moderate drinker and a heavy smoker. He had not been advised of the dangers of either liquor or tobacco.

The condition had grown steadily worse under treatment. There was no adenopathy. The Wassermann was positive. Microscopic examination negative. I kept the patient under observation for four weeks, during which time I gave him a dose of salvarsan, followed by iodid and mercury, the case growing progressively worse. Microscopic examination again was negative. A diagnosis of carcinoma was made and operation advised, whereupon the patient left me and went to a sanatorium to be "cured" by a vegetarian regimen and colonic flushings. I saw the case four months later, at which time considerable sloughing had occurred and there was extensive gland involvement and marked cachexia. I pronounced the case technically inoperable, but suggested removing the sloughing tongue mass by the cautery loop for palliation. The patient declined the operation and returned home, dying of hemorrhage and exhaustion within six months.

CONCLUSIONS.

1. Syphilis, via the so-called "precancerous" conditions—such as leucoplasia and gumma, with associated chronic diffuse glossitis—is the most potent factor in making dynamic the predisposition

underlying cancer of the mouth and tongue and probably also of the throat.

2. Alcohol and tobacco—especially the latter—and the local irritation produced by treatment of syphilis or by bad teeth, or both, are most potent factors in the etiology of cancer in syphilitics.

3. The local conditions furnish the exciting cause of cell proliferation and the syphilitic constitution supplies the perversion of cell nutrition through which the cancerous predisposition becomes dynamic.

4. Through the operation of the etiologic factors just mentioned, the syphilitic cell infiltration, and the scar tissue produced by it, are replaced by malignant cell growth.

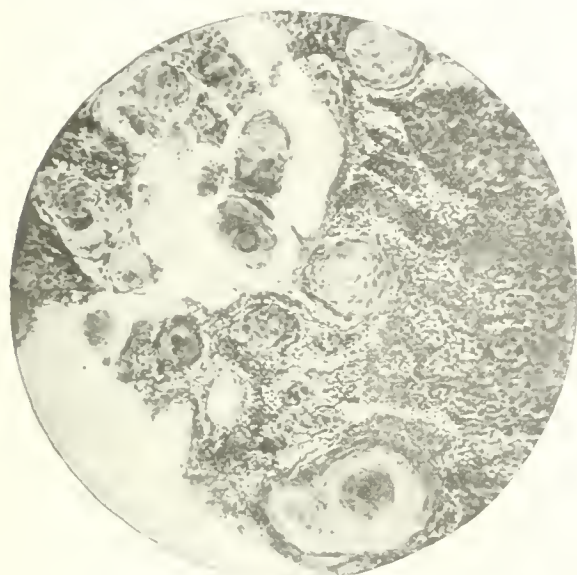


Fig. 13. Section from tongue in old syphilitic, showing typical epithelial nests with marked hyaline degeneration ("pearls") from area immediately beneath section shown in Fig. 4 (Case V) X 90.

5. The best prophylaxis of pre-cancerous lesions is afforded by rational constitutional treatment, avoidance of local irritation, careful mouth surgery and hygiene, and total abstinence from alcohol and tobacco.

6. The best prophylactic of cancer of the oral cavity—and especially of the tongue—is a concomitant of syphilis, is excision of all obstinate chronic lesions of the mucosa and sublying tissues, whether regarded as characteristically syphilitic or not.

7. The best time for operation in suspicion lesions of the tongue is before the diagnosis of malignancy is definitely established. Operation upon "pre-cancerous" lesions is much more effective as a life-saver, on the average, than is operation upon indubitable cancer.

8. Neither the microscope nor the Wassermann should rule the surgeon in doubtful cases. In experienced hands, the clinical diagnosis, even admit-

ting that occasional errors are probable, is safer in the long run than reliance upon laboratory methods, especially if the surgeon is even a fairly competent syphilologist.

9. In lesions of lesser magnitude, operations may be limited, but resection of half or all of the tongue—according to the location and extent of the lesion—is indicated in those of greater magnitude, and invariably when the diagnosis of cancer is clearly established.

10. The tissues beneath the jaw always should be cleansed out in the more extensive tongue excisions. This should include the removal of the salivary glands.

11. The average of successes from tongue resection, and the average longevity of the subjects operated, will be higher or lower according to whether the profession is dominated by sound surgical judgment and experience—with its obvious corollary, practical common sense—or by laboratory reports. In brief, the oftener we operate on "suspicion," justified by careful clinical study of lesions of the tongue, the better for humanity.

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TRAUMATIC FORWARD SUBLUXATION OF THE SHOULDER: A CLIN- ICAL ENTITY.*

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In recent surgical literature there are but few references to traumatic incomplete dislocation of the head of the humerus. Indeed, the occurrence of primary, uncomplicated, traumatic subluxation of the shoulder has never been definitely accepted. The older writers were far from agreeing on the subject, and later authorities deny the possibility of a subluxation of the shoulder except as a complication of an arthropathy or a paralysis, or as a chronic condition resulting from a complete dislocation. This is the view of Stimson.¹ Hamilton, in his also classic work,² declared "that the existence of this [forward] or of any other form of partial dislocation of the shoulder joint as a traumatic accident, has not up to this moment been fairly established; and that the anatomical structure of the joint renders its occurrence exceedingly improbable, if not impossible."

In Cotton's work³ there is no section on subluxation of the shoulder. "Rupture of the bicep tendon," however, he describes as "a condition which may be confused with subluxation. The condition is, in fact, a subluxation of minor grade."

For most of the reported instances of subluxation we must go back to early writers. Cases were mentioned by Petit, Duverney, Chopart, Hargrave, Dupuytren, South, Pinel, and others. Some of these, however, were probably associated with chronic arthritis. South's case was verified post-mortem; it showed a small tear in the capsule, but it was complicated by fracture of the coracoid, the acromion, and the clavicle; the head of the humerus rested on the anterior glenoid margin. Pinel's case was associated with fracture of the acromion, and acromio-clavicular luxation. In Hargrave's case the long tendon of the biceps was torn, and Chopart thought that in his case there was distortion of this tendon. In Dupuytren's case, the head of the humerus rested on the ribs (Hamilton). In the other cases clinically recorded in the pre-Roentgen period, we are not able to exclude such injuries as fracture of the glenoid rim, etc.

Astley Cooper was the first to describe at length "partial dislocation of the os humeri," which he believed to be "not a very rare accident." He re-

ported two cases observed clinically, and adds the description of the dissection of a third case, in which he found the long tendon of the biceps ruptured and the head of the humerus lying below the coracoid, occupying a new articular surface formed on the neck of the scapula. Hamilton says of this case, with much justification, I think: "We shall have no difficulty in assigning it to its proper place as a complete subcoracoid dislocation." The description of the deformity in Cooper's two other cases also leaves one in doubt as to their character. In the posthumous edition of Cooper's work⁴ is included a fourth case, a dissection by Douglass, in which, again, the head of humerus lay in front of the neck of the scapula—clearly *not* a subluxation.

Malgaigne's⁵ arguments for and clear description of forward subluxation of the shoulder afford much less basis for dispute. He believes that the condition results from stretching or slight tearing of the capsule; and he points out that a groove in the middle of the articular surface of the head of the humerus, made by contact with the glenoid margin, as described by Sedillot, must necessarily bespeak an incomplete dislocation. Malgaigne was able, on the cadaver, to produce a subluxation without rupture of the capsule, after removing the deltoid. Panas found himself unable to produce the lesion post-mortem.

In 1890, Broca and Hartmann⁶ recorded the dissection of a case of extra-coracoid dislocation, which, they said, was of the character that Malgaigne would have called a subluxation. They found a stripping up of the periosteum on the anterior surface of the neck of the scapula, where it was continuous with the capsule. They also found that all of the anterior half of the articular fibrocartilage of the glenoid cavity was torn off, and that a fragment of bone was detached from the inferior margin. Such complications could, of course, be readily recognized to-day by radiography. Broca and Hartmann believe that so-called partial luxations of the shoulder are, in fact, complete but not extensive dislocations.

Müller,⁷ in 1894, reported one and referred to four other cases of subluxation of the shoulder seen by him; but, evidently awed by the authority of Hippocrates, Desault, and Stromeyer, who denied the occurrence of this subluxation as a traumatic lesion, he, too, curiously concludes that the lesion is a secondary one due to rapidly developing atrophy and paralysis of the deltoid and supraspinatus, often also of the infraspinatus and teres minor, arising reflexly from tearing of the joint

* Read before the Orthopedic Section, N. Y. Academy of Medicine, January 15, 1915.

fibers of the circumflex and suprascapular nerves! This fantastic hypothesis need not detain us.

Coming now to recent authors, I find but the two following reports:

Vale⁸ records a traumatic subluxation of the shoulder resulting from a fall on the outstretched arm. The head of the humerus was prominent anteriorly. A radiograph showed the bones normal. There was, however, a subluxation of the acromial end of the clavicle.

Miriel⁹ reports five cases of forward subluxation. He emphasizes the insignificance of the causative trauma (sometimes even unappreciated by the patient), the absence of the chief symptoms of dislocation, and the variety of the functional disturbances produced. He notes that slight manipulation brings the arm into place, and that the patient can then move it freely.

We may pause here to consider the important question, *What is a subluxation of the shoulder?*

Subluxation of a ginglymus or an arthrosis is well recognized and understood as a sliding of the opposing articular surfaces one on the other so that they continue in contact over only a part of their surfaces. Of the enarthroses (shoulder, hip), however, some authors have maintained that a dislocation must necessarily be complete, that partial contact of the articulating surfaces is impossible. Hamilton says, of the humerus: "It is only by having placed the semi-diameter of the head of the bone outside of the margin of the glenoid fossa that it can be made for one moment to retain its abnormal position. . . . If we admit, with Malgaigne, that occasionally the capsule has been found capable of extension without actual rupture, I am still unwilling to regard this as a fair sample of a partial dislocation, since the head of the bone no longer moves in its socket, being at no point in actual contact with the articular surface of the glenoid fossa." Malgaigne had to contend with the same arguments in his own time. He said: "There are those who insist that in incomplete luxation there must be partial contact between the articular surfaces, and they refuse to give this title to luxations of the enarthroses in which the head of the bone is displaced but a little from the cavity, because all contact is destroyed. By this argument, a dislocation of the knee bringing the inner condyle of the tibia under the outer condyle of the femur is an incomplete luxation; but a subluxation consisting in the simple separation of articular surfaces, however slight, must be called a complete luxation. Let us return," he continues, "to positive science and true surgical conceptions. Hippocrates

denied the possibility of incomplete dislocation of the humerus and the femur, because he could not conceive that the rounded head of these bones could rest on the edge of the articular cavity without sliding in again or falling altogether out, but we thus see that such a condition, which he could not recognize, would constitute, in his eyes, a subluxation, indeed. . . . A luxation is incomplete when the articular surfaces have not passed entirely one beyond the other; the persistence of partial contact of these two surfaces or the absence of all contact is a matter that does not determine the degree of the luxation."

We might, of course, think of a luxation of the shoulder as incomplete if the head of the humerus has not passed through the capsule; but this is not always correct, for Eve¹⁰ and Broca and Hartmann⁶ have recorded instances of complete dislocation in which the capsule was unruptured, the periosteum continuous with it being stripped up from the neck of the scapula.

I would define as a subluxation of the shoulder one in which the articulating surface of the humerus has not passed beyond the edge of the glenoid, but remains in contact (even in articulating contact) with the joint surface of the fibro-cartilage attached to the glenoid margin.

With this conception in mind, I would take issue with the many who deny the occurrence of a pure traumatic subluxation of the shoulder. I base my acceptance of such a clinical entity on my experience with the three following cases:

CASE I: Miss A. D., aged 25, was referred to me on November 27, 1912, by Dr. Leo Kessel. On November 21, she had been riding a spirited horse, and her arms had been much jerked by the bridle reins. The next day she had severe pain in the left shoulder, radiating down the arm, and she was scarcely able to raise the arm. These symptoms continued.

There was a slight but unmistakable prominence of the head of the humerus anteriorly, and a corresponding slight depression posteriorly below the acromion—the deformity by no means, however, that of a complete dislocation. The outer (deltoïd) contour of the shoulder was normal. There was tenderness over the prominent head of the bone anteriorly; none elsewhere. The patient could perform internal rotation freely (put her hand behind her back), but abduction was very limited and painful. The x-ray picture showed nothing abnormal.

When I abducted her arm to the horizontal, the prominence of the humerus receded completely, the pain disappeared, and the patient was able to continue full abduction herself without difficulty. When the arm was lowered below the horizontal, the deformity, the pain, and the disability reap-

peared. We went through this maneuver several times, always with the same result.

The patient was put to bed with her arm continuously abducted to about 135 degrees, held in position by a sling passed from the wrist to the head of the bed, in much the same manner as I have described for the automatic restoration of abduction in the treatment of stiff and painful shoulder of other varieties.¹¹ On the fifth day the arm was released and the signs and symptoms promptly recurred. The abduction was therefore resumed, without intermission, for another six days, which effected a cure.

CASE II: Mrs. D. S., aged 38, referred by Dr. R. T. Frank, on July 9, 1913. This woman could recall no definite trauma, but she was accustomed to doing heavy washing and laborious housework.

For several weeks she had had severe pain in the right shoulder and inability to abduct her arm. For three days before consulting me the pain and disability had become worse.

There was moderate prominence of the head of the humerus anteriorly, a corresponding depression posteriorly, and slight flattening of the deltoid region. Abduction was limited to 60 degrees and rotation was also limited in both directions. The x-ray picture was normal.

Passive abduction met with so much resistance that I thought narcosis would be needed to reduce the subluxation. With some effort, however, I succeeded in fully abducting the arm without an anesthetic. As the extremity was raised the deformity disappeared with an audible snap, and active motions at once became possible.

The patient was instructed to keep the arm abducted alongside the head, in bed, for two weeks. I did not see her again, but I was told that her condition was thus cured.

CASE III: Mrs. A. S., aged 53, was admitted to Dr. Lilienthal's service in Mount Sinai Hospital on April 13, 1913. Three years previously she had had pain and stiffness in the left shoulder (duration not ascertained). For ten months she had again suffered severe pain and marked limitation of abduction and rotation in the left shoulder, which was very tender just under the margin of the acromion somewhat anteriorly. For this condition she had been treated in the out-patient surgical and physical therapeutic departments. The x-ray appearance was normal. It was believed that the patient was suffering from an adhesive subacromial bursitis, for which, since other measures had failed, open operation was indicated. In this judgment of the case I concurred.

As soon as the patient was anesthetized, however, and the muscle spasm relaxed, there was at once evident the deformity of an incomplete forward dislocation, viz., prominence of the humeral head anteriorly, depression posteriorly, and slight flattening in the deltoid region—none of these signs by any means as marked as in a complete luxation. As the arm was abducted, with palpable and audible tearing of adhesions, the deformity was reduced with a distinct snap.

The arm was kept in full abduction for twelve

days, in the same manner as the other two cases, which effected a cure of the subluxation. Then massage and passive movements were instituted to secure full function, and the patient was discharged on May 30, with the usefulness of her arm restored.

I recently saw a fourth case of forward subluxation of the shoulder in the Third Surgical Service of Mount Sinai Hospital. The patient, a middle-aged woman, gave a history of attacks of unconsciousness, during which she would sometimes fall. As the result of such a fall she was unable to abduct her left arm and had some pain in the shoulder, which presented the same slight deformity described in the three preceding cases. In addition, the head of the humerus could be moved forward and backward in the socket. The de-



formity was promptly recognized as a subluxation by all the members of the attending and house staffs who saw it. (See illustration.) The radiograph showed a slight fracture of the lower margin of the glenoid rim and a chipping of the greater tuberosity of the humerus. Moreover, the Wassermann reaction was strongly positive. The case is, therefore, not one of uncomplicated subluxation, not only because of the fractures, but also because there may have been a true arthropathy. I mention it here to indicate that the deformity of a shoulder subluxation can be recognized without much difficulty, and distinguished at a glance from the much greater deformity of a complete dislocation. In this case abduction did not effect reduction. This was accomplished by bringing the arm across the chest by a modified Kocher manipulation. When that position was relaxed the deformity reappeared.

It will be seen that my three cases much resemble those of Miriel, as he describes them—in the insig-

nificance of the producing violence, in the appearance of the comparatively slight deformity, and in the ease of reduction.

What is the anatomy of traumatic forward subluxation of the shoulder? I think we may assume—indeed, it has been shown—that there is a stretching or tearing of the capsule, and further that the largest arc of the articulating surface of the humerus, instead of lying in the center of the glenoid cavity, is moved forward to or upon the fibro-cartilage of the anterior margin of the glenoid rim. Whether articulation continues over an actual surface or merely in a line, I do not know; but it must be borne in mind that in these cases articulation is not by any means entirely lost—rotation can be performed, sometimes freely, with little or no pain and without crepitus.

What maintains the position of subluxation? Why does not the head of the humerus slip back into its socket or fall entirely out of it? Is any lesion other than the capsular injury necessary to maintain the deformity?

If, at the time of the injury, the glenoid rim impresses a groove in the cartilaginous surface of the humerus, as suggested by Malgaigne, this might be sufficient to maintain the malposition, if the arm were not rotated. But since rotation, which is not destroyed, would at once move the groove away from the rim, we may, I think, deny the necessity for postulating such a depression.

The long head of the biceps is believed to assist in maintaining the head of the humerus in its place; and various writers have held that dislocation or rupture of this long tendon is necessary to effect the deformity we have been considering. This has been based, partly at least, upon the early case of Soden (reported by Astley Cooper) of upward partial dislocation of the humerus resulting from displacement of this tendon. Hamilton strongly inclined to believe that such a displacement is essential to the production of so-called subluxation. However, he quoted Gerster, who, like Bardeleben, Pitha, and Volkmann, denied the occurrence of an uncomplicated dislocation of the long head of the biceps and insisted that it had never been satisfactorily demonstrated upon the living or dead subject. The tendon is retained in the groove between the two tuberosities by a fibrous prolongation from the pectoralis major, and is not easily displaced. In my own cases there was nothing whatever to suggest that such a displacement had taken place. If dislocation of the long head of the biceps will cause subluxation, rupture of the tendon ought to do the same. But such a rupture

may occur without any displacement of the humerus, and Hamilton confesses that in the only case of ruptured tendon seen by him the relations of the head of the humerus were not disturbed.

Can we deny that subluxation of the shoulder is not the result of a complete dislocation partially reduced? I do not think we can. In some people the shoulder dislocates from comparatively mild violence and sometimes such a dislocation is at once spontaneously reduced, and may thus go unrecognized. In my second and third cases I can by no means exclude such an occurrence. In the first case, however, if tugging on the bridle reins had actually produced a complete dislocation that had spontaneously receded, it seems at least likely that my manipulations of the arm six days later would have reproduced the dislocation.

While we cannot deny that subluxations of the shoulder are not the result of complete dislocations, on the other hand there is no reason for assuming that they are so produced. Until otherwise proven we may regard the condition as a primary one, and we may recognize that:

Pure, uncomplicated, traumatic forward subluxation of the shoulder is a real clinical entity.

It is an occasional cause of shoulder disability that has heretofore been overlooked in the studies of "stiff and painful shoulder."

It may be produced by very mild violence.

It is marked by prominence of the head of the humerus in front, a corresponding depression behind, slight or no appreciable flattening of the deltoid—all much less than in full dislocation.

It produces pain in the shoulder, radiating down the arm, and inability to abduct; but rotation may be but little inhibited.

It shows nothing abnormal in the radiograph. (Perhaps by stereoscopy or some other means the displacement may be demonstrable radiographically.)

In the series here reported the deformity was reduced by abducting the arm, and the condition was cured by maintaining abduction for twelve to fourteen days.

30 WEST NINETY-SECOND STREET.

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CONCERNING CERTAIN PROBLEMS IN URETHROVESICAL DIAGNOSIS AND TREATMENT (WITH DESCRIPTION OF A NEW INSTRUMENT).

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In the past decade we have witnessed a complete revolution in our conception of the proper method of carrying out operative procedures in the bladder through the cystoscope. The introduction of a new endovesical armamentarium, too, has altered not a little the technic of observation cystoscopy and catheterization of the ureters, whilst the adoption of the cysto-urethroscope in routine work has made possible the visualization of the posterior urethra and neck of the bladder in so clear a manner that this region has been transformed from a veritable terra incognita into a thoroughly explored and easily approachable field.

The development, introduction and perfection of new instruments have probably done more for the popularization of cystoscopic investigation than the prolific writings of the older specialists, who, it is true, almost monopolized this field for many years. This was due to the fact that they alone possessed the requisite skill to make a complete urological examination with the somewhat imperfect and cumbersome appliances at their disposal. Thus, the operating cystoscope of Nitze, in spite of the ingenuity of its inventor and the enormous amount of work entailed in its construction, must necessarily by reason of its complexity have been relegated into the hands of only a few skilful technicians. Then, too, the optical systems of the older observation instruments, the darkness of the visual field, the inversion of the picture, the traumatism inflicted by the large-sized, irregularly formed catheterizing cystoscope—all these presented diffi-

culties to the general surgeon, so that many refrained from using the instrument at all, and, strange to say, many even urged against this method of examination.

Although some ten years ago intravesical diagnosis and the application of therapeutic measures in the bladder were procedures resorted to by relatively few, what by the simplification of instruments, the invention of a new optical system, and the demonstration that lesions heretofore almost inaccessible could be brought to light with ease and precision, thorough investigation and thorough therapeutic operative methods in the bladder and urethra offer to-day no greater difficulty than any of the general surgical manipulations.

Thus, we have witnessed in this country, at least, at two different periods, the introduction and rejection of methods of technic in cystoscopic work, each time initiated by the development and popularization of new types of instruments. For a time the older Nitze cystoscope introduced by American students studying in Berlin and Vienna held almost complete sway in this country, only to be supplanted in great part by what may be regarded as a simpler method of catheterization—the method of Brenner perfected by Tilden Brown. The revival of the indirect method has been almost universal in the United States, however, since it was conclusively demonstrated some six years ago that the Nitze indirect prismatic system was after all the best to use, for the difficulties presented by the older instruments had been completely abolished with the construction of a new mechanical assemblage (Fig. 1), and by distinct improvements in the optical apparatus.¹ The principles laid down by the author at that time and the demonstration that the synchronous catheterization of both ureters could be made even easier than single catheterization with the older Nitze instrument, have been generally accepted; and even in the modifications of the author's instrument that have found their way into literature since, not a single essential element of these principles has been altered. Furthermore, when in 1910² by the use of three reversals³ it was found possible by the author to construct a telescope giving many times more light than we had heretofore been able to procure in catheterizing telescopes, it seemed that the most intricate problem and difficulty that confronted us in ordinary routine and catheterizing cystoscopy had been solved.

But we are not content to-day merely to look into the bladder and catheterize the ureters, for vesical and renal lesions present more difficult tasks to the cystoscopist and genito-urinary surgeon.

That keen investigator, Nitze, had already attacked these other problems when he developed a series of operating cystoscopes. With these, it is true, he was successful in doing operative work in the vesical interior. Others, however, had found his instruments so cumbersome, unwieldy, and complicated that relatively few genito-urinary surgeons possessed the skill and patience to master the difficulties of the technic. Operative cystoscopy, therefore, remained for many years rather of theoretical interest than a practical art. Indeed, the operating cystoscope seemed to be a curiosity in the armamentarium of a few, and not a generally useful instrument.

Some four years ago, after considerable experimentation, my endeavor to construct a cystoscopic instrument, by means of which operative and diagnostic work could be easily carried out, bore fruit in the production of the instrument depicted in figure 2. It was found possible *without appreciably increasing the size of the catheterizing cystoscope,*

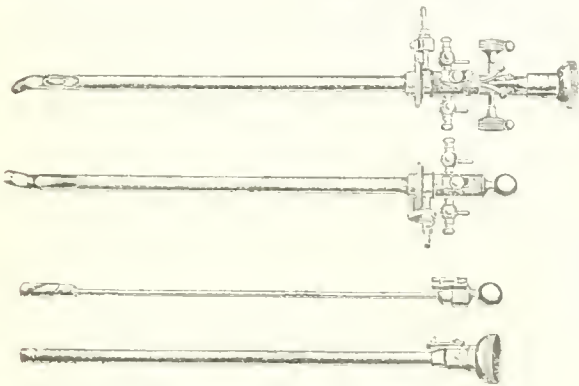


Fig. 1. Author's observation and catheterizing cystoscope.

to construct an instrument⁴ that would carry devices of adequate size, so that the execution of operative maneuvers in the interior of the bladder would be as precise and effectual as the manipulations that can be carried out by the surgeon under the direct guidance of the eye.

The most useful of the devices that can be introduced through the operating cystoscope can be seen in figures 3 and 4, where the forceps for the purpose of grasping foreign bodies, punch forceps for the removal of pieces of tissue, and cutting forceps are depicted. Some of these (Fig. 3) are made to pass through a flexible wire canula that can be directed against any part of the bladder interior, others (Fig. 4) close by a scissor-like motion and are practically part of the canula itself. In addition to these most generally useful instruments, there is the snare (Fig. 3), particularly to be recommended for the removal of papillomata. Figure 2 shows the operating cystoscope with one of the

operating forceps in place, the handle for the purpose of closing the jaws being also illustrated.

In practice I have found this instrument useful in the removal of foreign bodies, in the excision of pieces of mucus membrane for differential diagnosis of intravesical lesions, in the removal of portions of tumor for diagnosis, in the excision of callous ulcers, in the removal of small stones, in the snaring of papillomata and foreign bodies, in the division of a stenosed ureteral orifice, in facilitating the employment of the high-frequency current, in the introduction of olive-bougies for dilatation of the ureters, in the intravesical treatment of ureterocele by division and excision, in the passage of large catheters (such as could not usually be passed through an ordinary cystoscope), in the employment of more than two catheters for purposes of special diagnosis, in the excision of mucus membrane about the ureteral orifices, to diagnosticate renal tuberculosis, and in many other rare and interesting conditions.

Thus, some of the difficulties of observation cystoscopy, ureteral catheterization, and operative

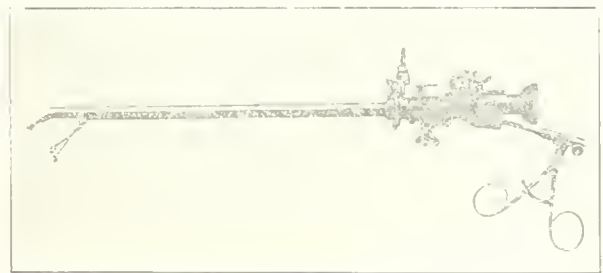


Fig. 2. Author's operating cystoscope.

cystoscopy had been eliminated by the adoption of properly constructed devices.

Are we able to say that no other problem in the field of visual diagnosis of the lower urinary tract remains to be solved? Indeed not. It is true that the demonstration of the anterior urethra had been adequately accomplished in principle, at least, by Desormaux.⁵ His endoscope has subsequently been perfected by many workers since the introduction of the modern electric lamp. But there still remained certain other portions of the urethrovesical tract that offered even greater difficulties than those with which the urologist had been previously confronted. I refer to the posterior urethra and to the region of the neck of the bladder, the latter including the spinteric and juxtasphinteric regions.

It is my purpose in this paper to refer briefly to some of my previous work, in which the question of the examination of the posterior urethra had been investigated, and then to show that even those

regions which are so difficult of approach, namely, the sphincteric and juxtasphincteric portions of the bladder, may be thoroughly scrutinized and made accessible for operating purposes.

In 1909 the shortcomings of the methods that had been employed up to that time for viewing the posterior urethra had induced me to direct my efforts towards the construction of an instrument by means of which the neck of the bladder and posterior urethra could be more satisfactorily seen. It is true that Goldschmidt had produced about this time an instrument that gave a fairly good view. However, even his innovation had left a great deal to be desired; for, not only do the structures brought into view by his instrument appear distorted by virtue of the very nature of the optical apparatus, but manipulation of the instrument in

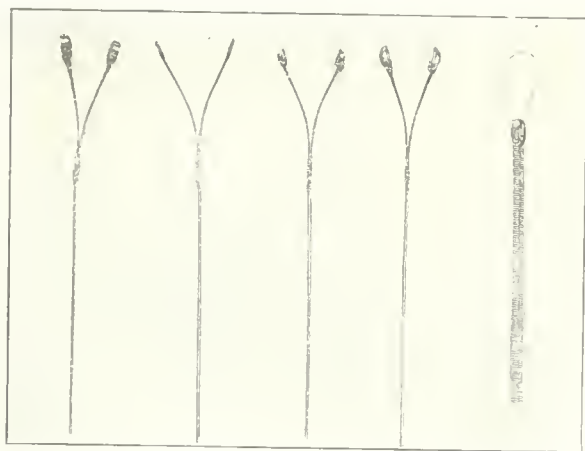


Fig. 3. Working ends of operating instruments including cutting, grasping, punch forceps and snare.

the urethra produced a certain amount of traumatism, because of its mechanical construction. All the drawbacks of this instrument, namely, optical distortion of the image, inadequate illumination and the probability of traumatism were overcome in the construction of an instrument to which I gave the name of *cystourethroscope* (Fig. 5). In this, by the adoption of a fenestra of small size into which the mucous membrane could hardly prolapse except at the verumontanum, by the employment of a new type of roof illumination and by the introduction of an optical system of small visual angle, it was found possible to establish conditions permitting of very good vision in practically all of the posterior urethra.

The possibilities of this instrument have been fairly well outlined in other papers.⁶ Its value in demonstrating clearly every detail of the posterior and anterior urethra has been sufficiently established so as to need no comment here. It suffices to say that we are now able to view the verumon-

tanum, utricle, ejaculatory ducts, prostatic ducts, sulci on either side of the verumontanum, the whole of the prostatic urethra, and a portion of the neck of the bladder with the same degree of distinctness and accuracy with which the interior of the bladder can be inspected through an observation cystoscope. I was able to show that operative procedures could be carried out in the posterior urethra, that ulcers and tumors could be cauterized by the fulguration method, that the ejaculatory ducts could be probed as well as the utricle, that the site of strictures of large caliber could be definitely outlined, that anomalies could be beautifully demonstrated, and that in the diagnosis of prostatic hypertrophy the employment of this instrument was absolutely essential for an exact appreciation not only of the extent of the hypertrophy, but of its nature and situation.

The region of the internal sphincter is even less accessible and certainly more difficult of approach with endoscopic operative instruments than the posterior urethra. Its anatomical conformation makes

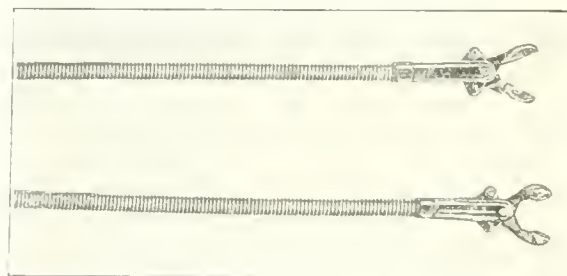


Fig. 4. Scissor type of cutting and punch forceps.

operative procedures through a cystoscope or urethroscope exceedingly difficult. Both in cystoscopy and in cystourethroscopy, we have to rely on a considerable extent for the clearness of the field upon the unfolding of the parts, that is, upon our ability to dilate the parts with a clear fluid, developing a space in which the telescopic instrument can have free play. This we are able to do in the bladder with great ease, where the sphincter successfully bars the egress or exit of the water after it is allowed to flow in. This, too, we are able to accomplish in the posterior urethra, but in a somewhat different manner. As the irrigating fluid flows out of the instrument at the fenestra, it tends to dilate the posterior urethra, its easy entrance into the bladder being successfully barred by the grasp of the internal sphincter about the shaft of the instrument.

Quite different are the conditions when the telescope is at the vesical sphincter. The fenestra is then partly in the bladder, into which the irrigating

fluid can pass without hindrance. Then, again, the distensibility of the vesical sphincter is much less than that of the posterior urethra or bladder, and the tendency of lens system and parts to be seen to approach each other is difficult to overcome. Not only this, but our attempts to gain room for operative work, for the protrusion of instruments of precision, must be rewarded with very little success in so small a working space, unless by reduction of the size of the appliances or by the construction of a special telescopic instrument, we are able to negate some of the obstacles above described.

Were it not for the fact that we not infrequently encounter lesions of this very part of the bladder, the necessity for an operating instrument would hardly arise. With the new type of cystoscope used in the convex sheath, with the so-called close-vision cystoscope devised by the author some years ago, and with the cystourethroscope a certain amount of operative work can surely be carried out in the sphinteric region.

However, neither the cystoscope nor the cystourethroscope can be regarded as completely satisfactory in this territory. The former is not ideal

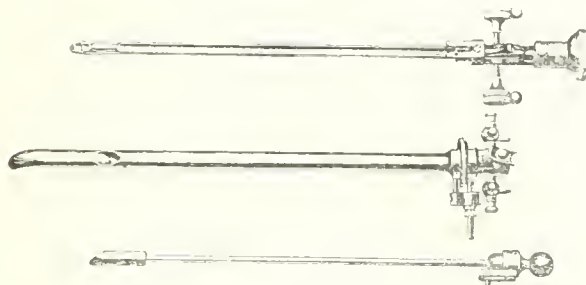


Fig. 5. Author's cystourethroscope.

for purposes of inspection by reason of its large fenestra, the great distance between the center of illumination and the part to be seen, and the nature of the optical system. Nor is it satisfactory in the accomplishment of work that must be carried out within a very small space. The experienced cystoscopist readily appreciates how impossible it is to illuminate the field properly with the cystoscope, how trans-illumination will occur, and how the deflector of the instrument will be situated too far back in the urethra for the guidance of the operating devices when the sphinteric region is to be attacked. Much better is the cystourethroscope in this regard, except that it will not carry forceps large enough for the excision of pieces for microscopic examination. In diagnosis and for fulguration it will, however, answer all purposes.

About a year ago, therefore, I devised an operating cystourethroscope which combines features of the operating cystoscope and cystourethroscope.

In this instrument it was thought wise to assemble the features of close-vision that were so successfully developed in the cystourethroscope with such variations in mechanical detail as would permit simultaneously the adequate inspection of the parts and their operative control. Figure 6 depicts this instrument, which, at first glance, might be regarded as identical with the cystourethroscope. However, it presents the following differences: the light is changeable, resembling that first suggested in the author's first type cystourethroscope; two different



Fig. 6. Author's operating cystourethroscope.

styles of lamps may be utilized, one small lamp that hugs the roof of the sheath and is designed for moderate illumination at the sphincter; another, shorter, more brilliant lamp that will be of greater use in illuminating the bladder. The former of these lamps is the one that answers practically all purposes, and will be seen to be situated very close to the telescope. This is an essential feature, if we wish to get proper illumination of parts that are limited to the small space presented by the internal vesical sphincter.

The telescope differs, in its length, in certain details of optical construction from that employed

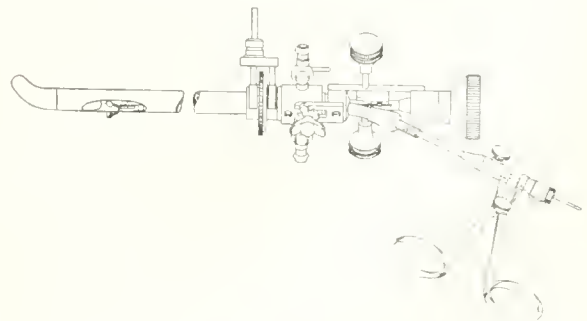


Fig. 7. Operating cystourethroscope with punch forceps.

in the cystourethroscope; and there is a larger deflector, one that will be strong enough to guide not only a stiff bougie or fulguration wire, but also small-sized operating punch forceps. Its ocular end is provided with a large catheter outlet, of sufficient caliber to carry one or two catheters, so that synchronous catheterization of the ureters is possible. A large bougie for dilatation of the ureter may be introduced, or smaller bougies or stylets for the exploration of the utricle and ejaculatory ducts. The sheath is similar to that found in the cystourethroscope, but its beak is shorter. This,

however, can be replaced by a longer one if we so desire. The sheath is slightly oval rather than circular in cross-section, first, in order to place the optical system as far away from the field as possible, and, second, to give room for the introduction of the operating devices.

In short, we have an instrument which differs only from the cystourethroscope in its *capacity* for the introduction of larger instruments and in the *possibility of their control*. The scope of the apparatus, too, is much wider, since it permits of easier catheterization of the ureters and of more extensive work in the bladder, in the sphincter, and in the urethra. By virtue of its longer deflector, the sphincter can often be pushed away, making access with operating instruments easier.

Perhaps the most useful field for the application of this operating cystourethroscope is in the treatment of papillomata at the sphincteric margin and in the removal of pieces of tumor for histological examination (Fig. 7), when situated in the same region. The following case will clearly illustrate the value of this instrument for just this type of work:

Multiple intravesical papillomata, multiple papillomata at the sphincteric margin.

L. L., male, age 58, gave a typical history of papilloma of the bladder, there having been hematuria for about two months without apparent cause and without pain. Cystoscopic examination August 5, 1914, showed a large papilloma about the size of a walnut situated about 2 cm. behind the left ureteral orifice, several smaller papillomata behind this in the posterior wall, and a large growth, the size of which could not definitely be determined, occupying the right half of the sphincter and juxtasphincteric regions. Several smaller papillomata arose from the sphincteric margin at the left side, and a rather large growth occupied the superior wall or roof of the sphincter apparently passing into the wall of the roof of the posterior urethra for a short distance and also into the bladder, thus occupying the sphincteric margin, the urethra and the contiguous bladder region (juxtasphincteric region).

Several treatments with the high-frequency current destroyed the large tumor behind the left ureter and the smaller ones in the posterior wall, the catheterizing cystoscope having been employed.

For the purpose of destroying the growths at the vesical margin, however, it was necessary to have recourse to the operating cystourethroscope, by means of which on October 3, 1914, several pieces were removed with the punch forceps for microscopic examination. These proved to be papilloma and the use of the high-frequency current was persisted in, the operating cystourethroscope being employed. With this instrument I was successful in destroying these papillomatous growths completely in a region where the ordinary cystoscope even with

a convex sheath would have encountered great difficulties.

Several other cases of the same type where the growths were situated either at the sphincteric margin or involved more extensively the urethra, the sphincteric margin and the bladder have been treated in this way. For precise and effectual work in this region, both with the high-frequency method as well as for the removal of pieces of tumor, the operating cystourethroscope must be employed.

In the posterior urethra, too, therapeutic manipulations can be executed with great ease and accuracy. Papillomata can be removed, the hypertrophic and inflamed colliculus can be excised; and the application of the high-frequency current is facilitated by the use of the operating cystourethroscope.

While in my own work the complete armamentarium—observation and catheterizing cystoscope, operating cystoscope, anterior urethroscope, cystourethroscope, and operating cystourethroscope—have all their proper sphere of usefulness, the general surgeon may dispense with the simple cystourethroscope, utilizing the operating cystourethroscope both for purposes of diagnosis and for special operative work.

¹ Buerger: *Annals of Surgery*, February, 1909.

² Buerger: *New York Medical Journal*, April, 1911; *Am. Jour. Urol.*, September, 1911.

³ Refers to reversal of image in the telescopic tube.

⁴ This instrument retains the essential principles followed in the construction of the author's cystoscope.

⁵ Desormaux's instrument, devised in 1865, consisted of a tube to which the source of illumination was attached. This was a kerosene lamp, the rays of light being reflected into the endoscopic tube by a mirror.

⁶ Buerger: *American Journal of Urology*, January, February, March, 1911.

THE GORGAS MEDAL OF THE N. Y. MEDICAL RESERVE CORPS ASSOCIATION.

A Gorgas Medal, to be awarded annually in honor of Surgeon-General Gorgas, U. S. A., has been established by the Medical Reserve Corps Association, New York State Division. Competition for this medal is open to officers of the Medical Corps of the United States Army, the Medical Reserve Corps of the United States Army, and the Medical Corps of the organized militia. Officers may submit papers on any subject of a medico-military nature.

General Gorgas has appointed the following board of officers to act upon papers submitted: Colonel Charles Richard, Lieutenant Colonel Champe C. McCulloch, Jr., and Major Eugene R. Whitmore, Army Medical Corps. These officers are members of the faculty of the Army Medical School and will have sole authority to appoint the time that papers are to be submitted and to pass upon their merits. All inquiries should be addressed to one of these officers.

THE LOCAL EMPLOYMENT OF IODINE IN
SUPPURATIVE PERITONITIS.F. T. FORT, M.D.,
LOUISVILLE, KY.

Clinical investigation and experimentation during the last few years have amply demonstrated the value of iodine as a local application in an infinite variety of infective and suppurative lesions. Also for sterilizing and disinfecting the hands of the surgeon and the operative field in any anatomical situation, likewise in the treatment of contused and lacerated wounds of every character where an antiseptic or germicide is required, it has been found far superior to bichloride of mercury and carbolic acid hitherto so extensively employed.

For injection in the treatment of joint inflammation the value of iodine has long been known. For example, as early as 1878, Orlow successfully treated several cases of knee-joint inflammation, with serous and sero-purulent effusions, by tapping and injection of iodine solution. Reaction was never severe, although some of the solution was allowed to remain in the joint. Durante also recommended that a one to five per cent. solution of iodine be injected into tuberculous joints, limiting the amount to about fifteen drops and repeating the treatment daily.

Biagi claimed to have cured tuberculous peritonitis by injecting iodine solution into the cavity. While pain followed injection, the method was devoid of danger. Favorable results from similar methods were also reported by Campanini.

In discussing the subject of peritonitis, the term "general" must be recognized as practically a misnomer, as the instances are exceedingly rare in which the entire peritoneal area is involved in an infectious or inflammatory process. The terms "diffuse" and "circumscribed" convey a more accurate idea as to the extent of the existing pathology. Moreover, it must be recognized that peritonitis cannot be correctly classified as a disease, *per se*, some other pathology being invariably responsible for its origin.

Diffuse peritonitis, the result of extension of infection from the abdominal and pelvic viscera, is always serious, whereas a circumscribed pelvic peritonitis may exist for a considerable period without inducing grave symptoms. The observable clinical manifestations of peritonitis may vary greatly in severity; they may be barely perceptible in one instance, and in another may be so marked that the Hippocratic expression has already developed and the individual is practically moribund when he is

first observed. If a favorable outcome is to be expected, the pathology must be early recognized and suitable treatment instituted without delay. The mortality attending diffuse peritonitis under older methods of treatment has been extremely high.

Notwithstanding the fact that the value of local applications of iodine in the treatment of tuberculous peritonitis has for many years been recognized, no one seemed willing to recommend the extension of its employment to peritoneal involvement due to other causes until quite recently. To Dr. Eugene J. Johnson belongs the sole credit for suggesting the intraperitoneal application of iodine solution in all varieties of peritonitis regardless of the etiology. As has been true with every other innovation in medicine and surgery from the beginning of history, this new method of treating peritonitis has not escaped criticism, many of the most prominent surgeons in the country being especially severe and even vituperative in their discussion of the hypothesis presented. While the method was first employed by Johnson in 1906, the details in connection therewith were not published to the profession until 1911. The following excerpt is taken from an article by Crisler and Johnson which appeared in the *Southern Medical Journal*, March, 1913 (p. 202). The expression "half-and-half" refers to a mixture of equal parts of alcohol and the official tincture of iodine, thus making a solution containing $2\frac{1}{2}$ per cent. or $3\frac{1}{2}$ per cent. in alcohol.*

"What we most wish to bring before you is the fact that, first, we are using the above-mentioned 'half-and-half' in all cases of peritoneal infection; whether it be localized, from an unruptured gangrenous appendix or other source, or whether the peritoneum is wholly infected, it makes no difference. We simply 'put out the fire' with this mixture and disregard infection thereafter. If we have a ruptured gall-bladder, for instance, as soon as this is discovered at the operation and before the incision is extended further, we literally pour a quart of this mixture into the abdomen and thoroughly sift it into all of the recesses. We do not fear the use of too much of the mixture; our only fear is that some pocket or interspace between the coils of intestines or elsewhere might escape us. If the case is already one of acute, general, fulminating peritonitis, we are even more liberal with the flushing out and washing out process with the 'half-and-half' mixture. If in our judgment a quart

*The present U. S. P. official tincture is 7% iodine, whereas it was formerly 5%. The expression "half-and-half" is evidently intended to indicate the mixture employed when the proportion of iodine in the official tincture was 5%. In their later writings these authors refer to a $2\frac{1}{2}$ % solution.

will do, that is all that is used, though we have sometimes used as much as a gallon. This applies equally to any other infection, whether it be a ruptured appendix with its consequent peritonitis, local or general, or a gunshot wound, or a ruptured bladder, or a ruptured tube, or any other infection from the pelvic organs, or a perforated ulcer, or what not."

My attention was especially called to this method of treatment by Dr. Johnson in a personal interview during March, 1911, at which time he stated he had used the method for several years. He was very enthusiastic and his arguments were convincing. It seemed certain from the results reported that iodine could do no possible harm to the pathological peritoneum, and his method seemed worthy of an extended trial. He explained that he had at first experimented upon dogs with peritonitis artificially produced, which proved so successful that he later decided to employ iodine within the human abdomen, and that his mortality from peritonitis had thereby been markedly reduced. Since the method was originally suggested by Dr. Johnson, he and Dr. Crisler have treated more than twelve hundred cases of peritoneal infection, using a 2½ per cent. solution of tincture of iodine in alcohol. Their success has been remarkable, the mortality having been reduced to almost the vanishing point.

It is manifestly impossible for any observer to form an intelligent opinion as to the merits or demerits of iodine by its experimental application to the healthy peritoneum of animals. It is quite likely that such applications would produce extensive peritoneal irritation with the formation of adhesions, and the evidence thus secured as to the usefulness of iodine would be distinctly misleading. In the highly inflamed peritoneum, however, it would not appear that iodine applied to the infected area should cause greater adhesion or absorption of toxic material than would occur from the existing pathology. On the contrary, the theory has been confirmed by practical experience that iodine to a certain extent neutralizes the inflammatory peritoneal exudate, thereby materially assisting in its resorption and contributing to a cure in desperate cases in which the mortality has been tremendous under other methods of treatment.

Shortly after the personal interview with Dr. Johnson a patient suffering from diffuse peritonitis following rupture of a gangrenous appendix came under my observation, and it was decided to try the method of treatment he had so graphically described. The result was eminently satisfactory, and

since then I have employed iodine in every case of peritonitis from any cause. The following list embraces a few of the cases in which iodine has been used during the last two years:*

N. B., female, aged 16 years; date of first observation May 9, 1912. Diagnosis, appendicitis, probably gangrenous, with diffuse peritonitis. The parents at first declined to permit the patient to be operated upon, but two days later (May 11), after a consultant emphasized the extreme gravity of the situation, they reluctantly allowed her to be taken to the hospital, where an immediate operation was performed. Upon opening the abdomen through a low median incision, pus appeared from every direction. Gentle digital exploration toward the right side caused the escape of a large quantity of purulent fluid. The hand was then gently carried toward the left, gradually pushing the intestines aside, and a still greater amount of pus was liberated from the left iliac region. The appendix was found gangrenous, and all the viscera were extensively adherent. Sixteen ounces of a two per cent. iodine-alcohol solution poured into the cavity were allowed to gravitate in every direction. Three rubber drainage tubes with gauze in the center were inserted, one each to the right and left fossa, and another behind the uterus. The patient was placed in bed in the Fowler position, and proctoclysis of salt solution and coffee given. During the first twelve to fifteen hours the indications were that the patient would almost certainly perish, but reaction occurred and she made an uneventful recovery. She is now working in one of the Louisville department stores, and so far as can be ascertained has remained perfectly well.

A. T., female, aged 23. Diagnosis, bilateral pyosalpinx, with circumscribed peritonitis. Operation June 27, 1912. One tube was greatly distended and densely adherent and rupture occurred during its removal, literally flooding the pelvis with pus. Six ounces of iodine-alcohol solution were poured into the pelvic cavity and a cigarette drain placed posterior to the uterus. This was removed in three days. Healing occurred without complication. Recovery.

R. H., female, aged 21. Diagnosis, bilateral pyosalpinx, with circumscribed peritonitis. Operation July 6, 1912. In this case also one of the tubes ruptured during removal, flooding the pelvis with purulent material. Ten ounces of iodine-alcohol solution were poured into the cavity and the wound closed without drainage. Proctoclysis not used. Healing by first intention. Recovery.

M. J., female, aged 27. Provisional diagnosis, bilateral tubo-ovarian disease, with diffuse peritonitis. Owing to the exceedingly thick abdominal walls, the exact nature of the existing pathology was undetermined prior to operation, which was performed July 9, 1912. Upon opening the abdomen by median incision, a large quantity of purulent material escaped. All the viscera were densely adherent. After considerable difficulty the adhe-

* These cases were briefly reported before a meeting of the Jefferson County Medical Association, Louisville, Ky., November, 1914.

sions were separated, and both tubes and ovaries being extensively involved in the pathology were removed. Great trouble was experienced in controlling the oozing which occurred from the separated adhesions. Nine ounces of iodine-alcohol solution were poured into the pelvic cavity, a cigarette drain inserted posterior to the uterus, with three or four stay-sutures. The patient left the operating table in extreme shock, but rallied in about twelve hours. One pint of black coffee-saline solution used by proctoclysis. Recovery.

S. D., female, aged 22. Diagnosis, appendicitis, probably gangrenous, with diffuse peritonitis. Operation June 2, 1913. When the abdomen was opened to the right of median line, a large quantity of pus immediately appeared in the wound. The appendix was found gangrenous, and there was also a complicating bilateral pyosalpinx. Several ounces of iodine-alcohol solution were poured into the cavity, and a large cigarette drain was placed in the cul-de-sac of Douglas. The patient was placed in bed in the Fowler position. Proctoclysis of saline-coffee solution given. Recovery.

J. M., female, aged 40 years, was admitted to the hospital the night of September 16, 1914, suffering from appendicitis. Refusing emergency operation, she was kept in bed until the following afternoon, when the symptoms of diffuse peritonitis became apparent. The serious nature of the condition and the imperative necessity for immediate surgical intervention being fully explained, she finally consented and was immediately taken to the operating room. When an abdominal incision was made through the outer border of the right rectus muscle, considerable purulent fluid escaped. Nature had accomplished little toward isolating the infectious material from the gangrenous appendix located to the outer side and posterior to the cecum. A decided fecal odor emanated from the ruptured abscess, and the appendix was so friable that its removal in the customary manner was impossible. The gangrenous portions were therefore merely "pinched off" with forceps, and pure tincture of iodine applied to the remaining stump and the surrounding infected tissues. Two rubber drainage tubes with gauze in the center were inserted, one in the cul-de-sac of Douglas, the other in the right iliac fossa. In addition, gauze strips saturated with a three per cent. iodine solution were introduced to the site of the gangrenous appendix and brought through the abdominal wound with the drainage tubes. The incision was partially closed, and the patient was placed in bed in the Fowler position. Proctoclysis of saline-coffee solution given. She left the hospital within three weeks. A fecal fistula, which was anticipated, did not develop.

For a most excellent résumé of the literature concerning the anti-microbial action of iodine in comparison with other drugs, see dissertation by Kinnaman, *Journal of the American Medical Association*, beginning with the issue of August 26, 1905, p. 600. See also the admirable paper by Senn, *Surgery, Gynecology and Obstetrics*, 1905, vol. I, p. 1; and the articles of: Roberts: *International Journal of Surgery*, February, 1913, p. 56; Post-Nicoll: Quoted by Roberts, l. c.; Crisler-Johnson: *Southern Medical Journal*, March, 1913, p. 202, *Southern Medical Journal*, February, 1914, p. 147, etc.

THE TREATMENT OF BURNS IN CHILDREN BY EXPOSURE TO AIR.

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NEW YORK.

Despite the endless methods of treating burns of the surface, whether produced by fluid or by flame, the results remain far from satisfactory. No local treatment will prevent the fatal result which follow burns of very large areas of body surface. The only hope of the future in these cases must rest upon a correct understanding of the pathologic process which ensues, a process that bears a striking analogy to the phenomenon of anaphylaxis, many of these cases presenting a scarlatiniform erythema before death. Among recent contributions to the pathology of burns, several observations tend to involve the adrenals as important factors. Thus, Kalisko¹ states that changes are found in the adrenals in deaths from burns. There may be more or less extensive hemorrhage infarction in acute cases and when death occurs later, marked hyperemia with reduction of lipoids. Possibly these changes stand in direct relation to the cause of death in burns.

Crile² has found that double adrenalectomy caused a steadily increasing exhaustion, and death in less than twenty-four hours, and marked changes in the brain cells. Animals exhausted by physical injury, by fear, by infection, insomnia, etc., showed identical changes in tissues upon histological examination. It is possible that here lies an explanation of the better results of the treatment of burns by the method to be described.

For those cases, however, which are not so extensively burned that recovery is impossible, a method of treatment may be applied which in a moderate experience has proved infinitely superior to any heretofore observed by me. It is an ancient method; and as Dr. Jacobi would put it, quite ancient enough to be new. Why it is not universally used is remarkable. It consists of exposing the burned areas to the atmospheric air. Nothing can be simpler, certainly nothing is more effective, unless it may be heated air as suggested by Stappato.³

During the last two years most of the burn cases at Lebanon Hospital have been treated in this way. Some of the cases have had a wet dressing applied

¹ Kolisko; *Vierteljahrsschrift f. gerichtl. med.* 1914. XLVII.

² Crile; *Anoci Association, etc. Jour. A. M. A.* LXIII. No. XVI, Oct. 17, 1914, p. 1335.

³ Stappato; *Abstract, J. A. M. A.* Vol. LXIII, p. 1797.

for twenty-four hours. Many of them had carron oil or some other oil dressing applied before being brought to the hospital. It has been found, however, that it is unnecessary to apply any dressing for eventy twenty-four hours; although it does not interfere with the subsequent treatment in any way, and has the advantage of perhaps rendering the wound cleaner.

The patients are placed in bed upon a clean sheet and the burned parts are left uncovered; the other parts of the body are well covered in cool weather. In warm weather it is necessary to keep the entire bed well covered with mosquito netting to keep flies from the wound. Opium in some form is usually necessary during the first twenty-four or forty-eight hours, after that rarely. The bowels are freely moved, and as soon as the patient is hungry a full diet is given. The wound after a short time takes on a very characteristic appear-



Fig. 1. Burned by flame November 26, 1914; second and third degree. Appearance December 12, 1914.

ance. Those portions that have suffered only a first degree burn assume a normal appearance, excepting for the redness. Those portions that are the seat of second and third degree burns crust over and, according to the depth, discharge purulent fluid under these crusts, which are lifted up and take on the appearance of rupia. When the exudate beneath the crust is not great, the crust remains until it falls off, leaving a reddened, healthy surface without scar.

Where the deeper burn produces a large edudation the scab is lifted until it is loose in nearly all its parts and a granulating surface bathed in purulent fluid is seen beneath. These crusts should be left as long as possible, but it frequently becomes necessary to remove them and clean the granulating surface thus exposed, by gently mopping with cotton moistened in boracic or other solution. The crusts form again immediately, but each time smaller, as healing from the edges proceeds very

rapidly. The granulations by this method do not bleed as when a dressing is applied, except where the crust is forcibly separated, or from mechanical injury from some other source. The granulations are constantly bathed in the purulent fluid held beneath the crusts.

To be sure, this method of treatment does not create a pleasant view. The odor and appearance of the wounds are two of the objectionable features, as is also the tendency of the patient to pick off the scabs. An attempt was made in one case to replace the putrefactive by fermentative organisms; lactic bacilli were sprayed over the surface



Fig. 2. Appearance January 9, 1915.

of the wounds which had been dusted with sugar. The results, however, were negative. Dusting the parts with boracic acid powder appears to aid materially in keeping the wound sweet, without interfering with the healing process.

The contrast between a burned child treated by this method and one treated by some form of dressing is striking indeed. The terror of the one waiting for the next dressing, and the shrieks which accompany such a dressing, and the comparative air of comfort and well-being of the other, is one not quickly forgotten. These children lie quietly in bed, present good color, smile and play when they can do so without disturbing the burned parts, and take their food with relish.

Nephritis would seem to be less frequent than in cases treated by dressings and, when present, to disappear sooner. The pallor and cachexia of these latter cases is not so noticeable as in those treated by dressings.

The degree of scarring is greatly diminished, the time required for healing is apparently much shorter.

These cases have all been observed in children, although several adults have been treated at the hospital in the same manner, and with the same degree of success. Because of cold weather and the necessity of keeping the wards cool, the burned part in one case was protected by covering with a blanket which, however, did not touch the region. In this case the healing process was much slower than usual.

Light and air are the important elements necessary to insure proper dessication and the best results.

SUMMARY.

1. This method is simple
2. It minimizes scarring and contractions.
3. Healing proceeds more rapidly than under dressings.
4. The shock of treatment is reduced to a minimum, as noted by the absence of pain, terror, and psychic disturbance.
5. Nephritis would appear to be less frequent and less severe.
6. The patient's spirits and appetite are maintained.
7. At the termination of the treatment the appearance of the patient is quite different from that which one is accustomed to see.
8. The treatment can be carried out at home, inexpensively.

THYROID ENLARGEMENT.

The thyroid gland is enlarged at times in infections in different organs of the body, noticeably in syphilis, scarlet fever, tonsilitis, and tuberculosis. This does not mean that the enlargement is due to a specific organism, but may indicate that the increased activity of the gland is due to its effort to eliminate toxic materials.—G. T. MATLACK in *The Therapeutic Gazette*.

TACHYCARDIA AND UTERINE GROWTHS.

A large number of uterine growths are associated with tachycardia and other circulatory anomalies. In some of these cases there is a palpable thyroid; in others no evident enlargement of the gland. In some an apparently normal thyroid may become tender and slightly enlarged during the presence of tachycardia. There may be localized tenderness, with slight enlargement of one lobe of the thyroid. In all of these cases one must investigate cautiously to determine the factor which has ungereared the circulatory system. In the presence of several of the symptoms of hyperthyroidia or perverted functions and the absence of other causes, though there is no evident goiter, the author would favor strongly the thyrogenous origin of the tachycardia.—HENRY N. EKKER, in *The Monthly Cyclo-pedia and Medical Bulletin*.

A NOTE ON THE OPEN METHOD OF TREATING BURNS.

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NEW YORK.

During the past seven years, 180 cases of burns have been treated in the wards of Lebanon Hospital, and of these 75 per cent. were in children. We have been interested to follow the various methods of treatment and have always felt that their results were most unsatisfactory. In the four years from 1908 to 1912 the mortality from burns of the third degree was 54 per cent. Few if any of those dying during the first 48 hours could have been saved, but we feel that many of those who died after several weeks or months would have recovered if they had been treated by the "open method."

The keynote of this treatment is "hands off." It may be compared in some respects to the present method of treating peritonitis. Formerly the surgeon by swabbing and washing tried to make the peritoneal cavity perfectly clean, and in so doing he removed the protective covering and broke up the fine adhesions which represented nature's attempt to limit the spread of the infectious material. Now the surgeon simply removes the free exudate and the source of the infection and interferes otherwise as little as possible, with the result that a far larger percentage of the patients recover. In the usual method of treatment of burns with local applications, the removal of the dressings, besides causing great pain, destroys the protective covering and fine granulations. Nature's tendency to conservation is well illustrated in the healing of burns if they are left to themselves; there is then the least possible loss of tissue and there results a thin, smooth scar instead of dense cicatricial tissue.

Those who die within 48 hours apparently succumb to an acute anaphylactic shock. In those who die later the kidneys are apparently unable to excrete all the foreign protein material that is absorbed from the disintegrated tissue at the site of the wound. If the wound is left alone the absorption of such material is slight.

The fever associated with these cases has usually been assumed to be of bacterial origin, but this is probably a mistake. The result of the absorption of an undue amount of foreign protein material is seen in the irritation of the kidneys as shown by the appearance of abnormal elements in the urine, and the often associated coma and vomiting remind

one forcibly of uremia. It would therefore seem rational to treat the condition in a similar manner to the treatment of uremia, namely, by improvising elimination through the skin, kidneys, and bowel. The treatment with hot air probably owes much of its value to its diaphoretic action.

For preventing the multiplication of the organisms of putrefaction, I have suggested powdering the parts with boracic acid, and I have found it very effective. Briefly outlined, the treatment would be as follows: During the first twenty-four hours, if the pain is severe, morphine is administered; after that the exudated serum covers the nerve endings and there is little pain if traumatism is prevented. Stimulants, especially suprarenal extract, are given to control shock. The parts are exposed to the air and are well powdered with boracic acid. Elimination through the skin, kidneys, and bowel is increased by the use of hot air, diaphoretics, high colonic irrigation with hot water, diuretics, and saline laxatives.

GASTRO-ENTEROSTOMY UNDER LOCAL ANESTHESIA: CASE REPORT.

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DAYTON, OHIO.

The patient was a man of 67 years. He gave a history of "stomach trouble," extending back two years; pain, nausea, and vomiting at frequent intervals during the last six months; progressive loss of weight and strength. For three weeks prior to operation there were signs of pyloric obstruction, but no tumor could be palpated. The only nourishment he received was by rectal alimentation.

Clinical diagnosis: Carcinoma of the stomach, with pyloric obstruction.

Treatment: Lavage of the stomach until the water returned clear. Inhalation anesthesia was considered unsafe in this particular instance.

Spinal analgesia with the patient lying on the side, shoulders and hips elevated, in order that a heavy anesthetic solution might run down into the dorsal curve and thereby anesthetize the segment of the body containing the stomach was considered. It was abandoned on account of the patient's weakened condition.

The skin of the upper abdomen was prepared with benzine and iodine. Novocaine 1:400 with 10 drops of adrenalin solution to the ounce was carefully injected into the skin and deeper tissues for a space of four inches in the midline between the ensiform cartilage and the umbilicus. After an interval of ten minutes the same area was injected with quinine-urea hydrochloride 1:200.

The incision, begun fifteen minutes after the first insertion of the needle and carried through skin, fascia, muscle, and peritoneum without discomfort to the patient. Careful exploration of the stomach revealed inoperable carcinoma of the pyloric region, and the manipulation caused no particular distress.

The under surface of the transverse mesocolon was exposed and a point on the jejunum about 25 cm. from its origin selected. The lowest point on the anterior wall of the stomach was also selected. These two points were quickly approximated by means of a Murphy gastro-enterostomy button. To preclude the possibility of the formation of a spur at the point of union, Lembert stitches were placed between the stomach and jejunum distal to the button. The parts were returned to their normal cavity, the abdominal incision quickly sutured in layers and the skin approximated by Michel clips.

Cutting and puncturing the viscera appeared to cause no pain. The patient assured me that the only time he was uncomfortable was when traction was made on the stomach and bowel.

There was neither shock nor acceleration of pulse. He left the operating table in as good condition as he came on.

Post-operative history: Complete absence of nausea and vomiting. Rest in bed in the sitting posture for eight days, at the end of which time the patient was removed from the hospital. Liquid diet in increasing amount and variety after the first 24 hours.

This operation is only palliation, of course, but it can be quickly accomplished under local anesthesia, with little discomfort to the patient.

DUODENAL ULCER.

The great majority of cases of gastric or duodenal ulcer will give some indication of their presence from the Roentgen ray examination, although at times, even a typical clinical case may yield no information, and a doubtful case may still remain doubtful. The points to be considered are, the clinical history, the tender spot, examination of the stomach contents and of the stool; increased peristalsis, spasm; the interval of time occupied by the stomach in emptying itself, retention and rarely antiperistalsis; the evidences of adhesions or of cicatrization; the contour of the organ, the presence of diverticulum, penetrating ulcer or hour-glass. By carefully considering these points, we are usually able to venture a positive opinion, for or against ulcer.—W. A. WILKINS in *The Canadian Medical Association Journal*.

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WALTER M. BRICKNER, M.D., Editor

NEW YORK, FEBRUARY, 1915.

THE MEDICAL PICKWICK.

Have you listened to the lisplings, heard the whiffling, whistling whisperings.

Seen the strange mysterious trystings that are going on in town?

There's to be another journal blazing forth from depths infernal.

Or perhaps from realms supernal it will gaily flutter down.

There's a direful dearth of papers that can chronicle the capers

Of the big and little apers of Hippocrates the sage. There are clinics, there are cases jotted down in divers places.

But the medic and his graces are not found on any page.

* * * * *

There's a new medical journal. This time, if you please, it's not "another journal you'll have to read," but another journal you are going to read, read regularly and, we venture to predict, read from cover to cover every month before you can be tempted from it to any of the regular medical publications that come to your desk.

For this is a new journal in the date of its birth not only. It is altogether new in its substance and in its purpose. Not a word of scientific medicine is in it, not a case report, not an "abstract of current literature." And yet in dignity, in interest, in yield of inspiration, this magazine will find a worthy and a welcome place among its many more familiar brothers that bear the burden of dry medical facts.

As we look through the pages of the first number of *The Medical Pickwick*, issued a few weeks ago, we wonder that no one before undertook to publish what many medical men have long wished for—a magazine devoted to the purely literary and humanistic side of medicine; to verse, fiction, humor, satire, biography, anecdote, and lore of or by

medical men; a periodical to quicken the interest of physicians in the history of their art, to stir and amuse them with genial satires of their own foibles, to banish the fatigue of their daily grind with pleasing wit and well selected verse, to tap their pent-up skill in fiction, biography, history—in short, a magazine both light and serious for the intellectual side of doctors as doctors.

Just such is the new journal, *The Medical Pickwick*. That in the first issue, before its existence was generally known, all the various qualities of the publication should be displayed by so much and such excellent material, is a creditable accomplishment by the editor, Dr. Samuel M. Brickner, of Saranac Lake, N. Y. Known to many as well by his own excellent verse and lay writings as by his contributions to gynecology and obstetrics, he has no doubt sounded his Pickwickian horn to his literary friends, and forty-eight pages of delightfully interesting, clean, dignified, and well illustrated reading was the response. Fielding H. Garrison, of Washington, editor of the *Index Medicus*, and author of a quite remarkable history of medicine, bespeaks the dignity and purpose of the magazine in a "foreword" of charming style. Among the very many other features are an excellent jingle by Samuel W. Kelly, of Cleveland, author of the volume "In the Year 1800" and numerous other contributions to literary medicine; "The Singer in the Snows," an illustrated story of Robert Louis Stevenson at Saranac Lake, by Stephen Chalmers; "Julius Pagel," the medical historian, by Major Seelig, of St. Louis, himself a deep student of medical history and a master of literary expression; "The Pickwick Medical Society," a laughable satire on medical meetings, by Ira S. Wile; "Modern Medical Writers," by Davina Waterson; "The Surgeon in the Field Hospital," from an old magazine; "Therapeutics of Two Hundred Years Ago," by Alice Chadwick, and many other historical contributions such as "Incubation at the Temple of Epidaurus," "Chaldean Incantation Against Disease," "The First Account of Mountain Sickness," "William Hunter," "John Radcliffe," "An Old English Sign-Board," and numerous anecdotes. There is an intimate sketch of Abraham Jacobi, of the authorship of which we suspect the editor, as we do the authorship of a brisk and amusing satire on newspaper publicity, entitled "Pronouncing Him Dead," and the sketch "Dr. Hulett's Sonnet." There is a short article on "Nut-Raising," by Robert T. Morris, of New York; a column devoted to "Holmesiana," and several other interesting articles, reminiscent, satirical, and otherwise. And with this bountiful literary feast are served numerous delicious tid-bits—editorials, poems, cartoons, anecdotes, jokes, portraits, book reviews. Surely, such a magazine as this will be welcomed by those physicians who have a sense of humor, those who want to be amused, those who are interested in the historical and humanistic sides of medicine, and those who possess literary talent or even only a readiness to enjoy good literature—and who are there in the profession who lack all of these qualities and feelings? Surely, too, *The Medical Pickwick* will be

come the natural repository for the short biographical sketches that have had to find a desultory place now in this medical journal and now in that one.

Accustomed as we are to devote the editorial pages of the JOURNAL to strictly surgical subjects, this rather lengthy consideration of another non-surgical journal probably seems a wide departure from our rule. But though we here usually adhere to the dry discussion of scientific topics, the literary aspects of medicine are close to the hearts of the JOURNAL staff, and we believe that the advent of *The Medical Pickwick*, so important in the development of American medicine, so pregnant with interest to the profession, deserves to be brought thus prominently to attention. Itself dealing only with surgery the science, the JOURNAL would urge and encourage all the qualities and attributes of surgery the art. And so, with Kelley, we say for *The Pickwick*:

Surgeon, drop your scalpel gory, seize your pen and write
a story

That will celebrate the glory of the art that you profess.
Doctor, rest your dulled gray matter while you generously
scatter

Your superfluous lore in chatter for our dictographic
press.

—W. M. B.

THE QUADRICENTENNIAL OF ANDREAS VESALIUS.

Brute man, brute through all the dark and all the gilded centuries, fighting for his existence like the other brutes, buckles on the horrid habilaments of hell and hurries forth to slaughter and destroy. And insatiable War, his cunning, cherished companion through all the ages, with devastating shell and shrapnel shrieks derision of his boasted civilization.

The great University of Louvain, rich in priceless collections and incunabula, cherished in the traditions of centuries, is in ruins. In those halls trod many of Europe's greatest scholars and scientists. There Andreas Vesalius, the great anatomist, taught and studied, and there, and at Brussels, the city of his birth, the quadricentennial of that event was to have been celebrated a month ago.

Belgium has sorrows far greater than the passage, uncelebrated there, of this occasion, far greater even than the loss of its famous old university. But among scholars and scientists, and not the least among medical men, the destruction of that great institution of learning will remain a bitter memory of the war long after the Belgians are, we hope, restored to homes and prosperity.

Medicine is international; and so the quartercentenary of Vesalius, perforce neglected in the land of his birth, has not gone unmarked elsewhere. For example, in New York and in Boston it was observed by interesting addresses and exhibits of

books and engravings, and in Denver the life of Vesalius was made the subject of the presidential address by Dr. Carroll Edson before the County Medical Society.

Vesalius's contribution to medicine needs no lengthy consideration here. It is familiar to most medical men, certainly to those who have interested themselves in medical history. That he upset many of the blindly followed teachings of Galen was a great accomplishment; that he conducted and published, with engravings of artistic beauty and scientific precision, a systematic dissection of the human structures was a greater accomplishment, but that he established the study of anatomy in the path that it has since followed is, as Dr. Wm. H. Welch emphasized in New York, his greatest achievement. Dr. Lewis Pilcher well said at the Boston meeting: "After all, it is not so much what he did—other great anatomists have lived and worked since that time—but the spirit which he exemplified and perpetuated, that counts. We do well to honor his memory by such assemblies as this. We do best of all if into our own work we incorporate somewhat of that spirit of inquiry, industry, boldness, zeal, energy, breadth of vision, doubt of dogma, insistence upon demonstration, which the world acknowledges to have been the peculiar characteristics of the Vesalian Spirit!"—W. M. B.

FRACTURE NUMBER.

It would be almost platitudinous to say that the treatment of fractures occupies to-day a large place in surgical thought. The study of bone repair, the development of operative methods, and the application of stricter criteria to results brought this about. Old as it is in medicine, the management of fractures—fundamental in the surgical study of the physiology and pathology of the bones and joints—is to-day in a re-formative stage. Our mechanical methods, our operative procedures, nay, our physiological conceptions, are in the threshing machine of surgical activity.

It is because of this activity, because of the confusion that may arise in the mind of the physician from the reading of scattered reports, some too conservative, some over-enthusiastic, that the JOURNAL has from time to time devoted an entire issue to fractures, and has published therein articles most of them specially prepared, by men who have been leaders in the study of the treatment of fractures in its various aspects—mechanical, operative, economic. Thus, the last fracture number of the JOURNAL (January, 1914), which was very warmly received, contained valuable articles by Magruder,

Estes, Van Duyn, Albee, Stimson, Young, Cotton, Elsberg, and others; an editorial review of the subject; editorial suggestions concerning fractures; a statistical study of "fractures and social loss" by Ira Wile; and an illustrated critique and bibliography of recent fracture literature by J. C. A. Gerster.

The next (March) number of the JOURNAL will, again, be devoted to fractures. It is to contain the following contributed articles: "Classification of Fractures," by J. B. Walker, New York; "Treatment of Fractures," by B. F. Zimmermann, Louisville; "Fractures in the Neighborhood of the Joints," by Jas. K. Young, Philadelphia; "Inlay and Peg Bone Graft in the Treatment of Fresh and Ununited Fractures," by Fred. H. Albee, New York; "Fractures of the Femur," by W. L. Estes, South Bethlehem, Pa.; "The Treatment of Fractures of the Lower Extremities, with End Results," by J. H. Downey, Gainesville, Ga.; "The Prevention and Treatment of Disabilities Following Fractures of the Limbs," by Astley P. C. Ashhurst, Philadelphia; "Medico-Legal Features of Fractures," by William H. Marcy, Buffalo; "Non-Reducing Operations for Fractures and Dislocations," by William Darrach, New York; "Hip Fractures," by F. J. Cotton, Boston; "The Abduction Treatment of Fracture of the Clavicle," by John J. Moorhead, New York; "Fracture of the Ankle," by J. E. Pirrung, Cincinnati; "Infected Compound Fracture of the Femur into the Knee Joint; Conservative Treatment," by Howard Lilienthal, New York.

We bespeak for the coming "fracture number" the same interest that its predecessors attracted.—W. M. B.

HARE-LIP, CLUB-FOOT AND SYPHILIS.

New York, January 15, 1915.

EDITOR, AMERICAN JOURNAL OF SURGERY:

In the editorial column of your January issue, under the caption, "Damaged Goods," you call attention to what you consider an error on the part of the author of that play in assigning to certain fetal malformations [hare-lip, club-feet, and "congenital hip disease"] a syphilitic origin. You deny this etiologic relationship and advise the correction of this statement "in the interest of the peace of mind of such mothers, even more than for the mere sake of accuracy."

You said of the play "the medical data it presents are for the most part accurate and well chosen." For accuracy sake permit me to cite you an authority for Brieux' statement. I refer you to the monograph, "Recherche et Diagnostic de l'Her-

ido-Syphilis Tardive," by Edmond Fournier, Paris, 1907, which is replete in examples from personal observations, supported by citations from eminent authorities, that these malformations are syphilitic in origin.

It is probable that this classic work was the authority consulted by Brieux, and the correction you recommended is therefore unwarranted. The proof of the accuracy of the medical facts precludes any discussion of changes for sentimental reasons.

MARTIN W. WARE, M.D.

We thank Dr. Ware for citing an authority for Brieux' statement. We questioned, however, the correctness of the statement itself, not the playwright's information. That hare-lip, club-foot, and similar fetal malformations appear in syphilitic children, just as it does in other children, there is no doubt. That they occur as a result of syphilis we very much doubt. Probably every practicing physician has seen several otherwise perfectly healthy children born with hare-lip or club-foot, of healthy parents. What percentage of children with these anomalies show stigmata of syphilis? What percentage of the many recognizable hereditarily syphilitic infants have hare-lip, club-foot, or "congenital hip disease" (whatever that may be)? Now that we have a reliable serologic test we may determine the correctness of Fournier's assertion. Until it has been thus substantiated we shall continue to share the general belief that these fetal malformations are not evidences of a syphilitic taint.—W. M. B.

Surgical Suggestions

In the acute stage of gonorrheal salpingitis operation is contraindicated. The condition usually subsides under conservative treatment, and may even undergo spontaneous cure.

Sometimes acutely inflamed pus-tubes rupture into the peritoneal cavity, which provides an urgent indication for operation. These are probably instances of mixed infection.

The actual rupture of a pus-tube is apt to be preceded by attacks of severe local pain and weakness. Such attacks should suggest the possibility of an impending rupture and the desirability of relieving the tension in the sac by a vaginal incision if the case is a recent one, or of salpingectomy if the condition is a recurrent one.

Surgical Sociology

Ira S. Wile, M. D., Department Editor.

SOME DISPENSARY PROBLEMS.

The most striking advance in connection with hospital work is the development of out-patient departments. The number of dispensaries and out-patient departments existent at the end of 1914 probably total nearly 900, of which 400 are general dispensaries and 300 for tuberculosis only. The rapid increase in the number of dispensaries is evident from the fact that during fourteen years their number grew seven-fold. To-day, out-patient departments are distributed throughout the Union, and only ten states are to be found without one of these necessary institutions.

Naturally, the larger the city, the greater the need of dispensary service, so that it is not strange to find that 75 per cent. of the dispensaries are in the cities of over 100,000 inhabitants and only 10 per cent. in towns of less than 20,000. The increase of dispensaries in smaller communities is more marked at the present time than ever before and represents a wholesome advance from the understanding of the importance of the service rendered.

The rapid increase of special and general dispensaries since 1900 has probably been due in part to the increased demand of physicians and surgeons for clinical material. A further factor in their development has been the need of a large portion of the public with limited means who have been made medically dependent, owing to the pressure of the rising cost of living. A more important reason, however, in the organization and growth of dispensaries has been the increased interest in public health.

The propaganda for the protection of the community from the ravages of diseases, as tuberculosis, trachoma, cancer, hookworm, and the like, has employed out-patient clinics as part of their work. This is most strikingly illustrated in connection with the campaign for the prevention of tuberculosis, which has resulted, within ten years, in the establishment of 300 tuberculosis clinics. Similar results, though not so large in numbers, have been attained through the campaign against infant mortality, mental defectives, and the prevention of cancer.

The wider dissemination of knowledge among industrial concerns relative to the importance of conserving the lives of employees, together with the pressure from potential workmen's compensation acts, have impelled industrial organizations to establish dispensaries for the benefit of their employees and even the members of their family.

An appreciation of the importance of social service work and the following up of the cases dismissed from hospitals has led to an increase of out-patient facilities for the purpose of restoring discharged patients to a state of economic efficiency.

The report of the Committee on Out-Patient

Service of the American Hospital Association (*Modern Hospital*, January, 1915) calls attention to many interesting facts relating to the development of out-patient service.

The question of the cost of dispensary service is of the utmost importance. The figures which seem to indicate that a cost per visit of a patient of less than twenty cents or even twenty-five cents is indicative of either a low standard of service or of an inadequate system of cost accounting. Unfortunately, in general dispensaries connected with hospitals complete data are not available to start the unit cost of dispensary service entirely from that of the hospital itself. Naturally, the cost depends upon the amount of money expended upon the entire plant and the number of visits paid by each of the patients.

From the standpoint of efficiency, with an inadequate expenditure of money, a proper standard of clinical work is difficult to maintain. If there be over-pressure by reason of numbers, the work even in a well organized plant must naturally fall below high standard. Of course, the standards of dispensary efficiency must be more or less relative to the form of its organization, the extent of its work, and the community it serves.

It is a peculiarly striking fact that while the large majority of dispensaries state that they have adequate facilities for laboratory examinations, these facilities are not properly utilized by the staffs of the dispensaries. It is patent that this is a reflection upon the character of the dispensary service afforded and does not indicate the high standard of the medical service which might be expected with available facilities for scientific clinical work.

An excellent criterion of the general service of dispensaries may be found in the per cent. of patients who paid only one visit to the clinic and failed to return, despite the fact that further treatment was needed. Where actual tests of this fact have been made, it has been found that the percentages of patients paying but one visit have varied in different institutions and clinics from 30 to 75. This would indicate on the one hand a large wastage of effort in medical and surgical service, and on the other, a lack of efficiency in remedying the conditions of the patients who fail to visit the clinic more than once.

Obviously, this subject requires further investigation, in order to determine whether the greater responsibility rests upon the clinic or upon the patients. Furthermore, it would be interesting to ascertain what proportion of patients fail to return to one clinic and present themselves for treatment to another clinic.

The rapid growth of dispensaries in this country has interfered with their scientific investigation in terms of results and has permitted the organization of new dispensaries in a hasty and inefficient manner. It is necessary to improve the standards of out-patient service and to make thorough studies of the administrative, clinical, and social service which they are affording to their patients. To establish standards of service is a difficult matter. It is necessary, however, to examine the facts at

present demonstrable in connection with existent clinics in order to determine any standards for the dispensaries of the future. In no type of clinic is this work more necessary than in the surgical dispensaries connected with general hospitals or in emergency dispensaries that have an independent existence.

The function of an out-patient department is to serve not alone the hospital with which it is connected, nor even the individual patient applying for treatment; it has a wider duty of far greater significance in its relation to the welfare of the community that sponsors its development.

Book Reviews

Surgical Materials and their Uses. ALEXANDER MACLENNAN, M. B., C. M. (Glas.), Visiting Surgeon, Glasgow Royal Hospital for Sick Children; Assistant Surgeon, Western Infirmary, Glasgow; Consulting Surgeon in Glasgow, East Coast Railways; Honorary Consulting Surgeon, Royal Infirmary, Stirling; Consulting Surgeon to the County Council of Lanarkshire. Duodecimo; 252 pages; 277 diagrams and illustrations. New York: LONGMANS, GREEN & Co., 1915. Price, \$1.25, net.

This small volume deals with subjects of interest to all practical surgeons. Bandaging, the making of splints and dressings, the various antiseptics and their indications, the preparation and uses of sutures and ligatures, the choice and use of instruments—all these matters and many more are treated here briefly and in the light of the author's experience. The section on splints and the section on instruments possess particular value to those who seek suggestions of proved service.

The Cancer Problem. By WILLIAM SEAMAN BAINBRIDGE, A.M., Sc.D., M.D., Professor of Surgery, New York Polyclinic Medical School and Hospital; Surgeon, New York Skin and Cancer Hospital, etc., etc. Octavo; 534 pages. Illustrated. New York: THE MACMILLAN Co., 1914.

The perusal of this very comprehensive book affords a sense of melancholy, not, we hasten to add, because the author has not done his part well, but because the book tells of so much work done with so little accomplished. We cannot escape the thought of how utterly futile this book will be, should the cause of cancer be discovered tomorrow. Although published only yesterday, this book would be as suddenly ancient as the Humoral Pathology of Galen. Bainbridge conscientiously reviews all the theories, both old and modern, of the cause of cancer; he relates the story of cancer research, especially that concerning animal tumors—but when it is all done, ignorance is still our portion.

We come upon a little surer ground when we read of the distribution and statistics of cancer, but even these subjects, we feel, are only desperate graspings at straws. They remind us strongly of old text-book discussions upon malaria before the mosquito etiology was discovered. The chapters that give one the largest sense of security are those upon histopathology, the clinical course and diagnosis of cancer and the treatment, non-surgical and surgical. The discussions are on broad lines and leave nothing to be desired in the way of clearness, soundness of reasoning, completeness and modernity. But what a waste of valuable space is the author's serious discussion of all the various cancer "cures"! These could conscientiously be dismissed in one or two sentences, instead of a chapter of 40 pages.

Of the general features of the book, little need be said. It certainly covers the ground and is ably written. For

the special investigator it should prove serviceable, for it affords a wide and critical summary of the literature and includes an excellent bibliography.

Balneo-Gymnastic Treatment of Chronic Diseases of the Heart. By PROF. THEODOR SCHOTT, M.D., Bad-Nauheim, Germany. Duodecimo; 181 pages; 87 illustrations. Philadelphia: P. BLAKISTON'S SON & Co., 1914. Price, \$2.50.

As Dr. James M. Anders says in the foreword he has written to this book, physical therapy has been much neglected, both in the United States and in England, and this little book, dealing, as it does, with the mechanical and balneologic treatment of cardiac disease, should therefore arouse considerable interest. The author gives a detailed description of the Nauheim bath treatment and what therapeutic results may be expected from it. He also discusses the treatment of cardiac cases by means of graduated resistance-exercises, and shows by means of numerous full-page illustrations exactly how these gymnastic exercises are to be carried out. The book is undoubtedly one that may be read with much profit by anyone interested in the treatment of chronic heart disease.

The Question of Alcohol. By EDWARD HUNTINGTON WILLIAMS, M. D., formerly Associate Professor of Pathology, State University of Iowa; Assistant Physician in the New York State Hospital Service. Duodecimo; 121 pages. New York: THE GOODHUE COMPANY, 1914. Price, 75 cents.

Any one interested in the temperance question will find much valuable information in this little book which contains reprints of papers published in the *Medical Record* and in the *Survey*. The subjects treated are: The Drug-Habit Menace; Temperance Instruction in Public Schools and Its Results; Liquor Legislation and Insanity; The Liquor Question In Medicine.

Progressive Medicine. Edited by H. A. HARE and L. F. APPLEMAN, Dec. 1, 1914. Philadelphia and New York: LEA AND FEBIGER.

This number contains the following reviews: Diseases of the Digestive Tract and Allied Organs, the Liver, Pancreas and Peritoneum, by E. H. Goodman; Diseases of the Kidneys, by J. R. Bradford; Genito-urinary Diseases, by C. W. Bonney; Surgery of the Extremities, Shock, Anesthesia, Infections, Fractures and Dislocations, and Tumors, by J. C. Bloodgood; and Practical Therapeutic Referendum, by H. R. M. Landis. These reviews of the progress of medicine in their respective branches maintain the high order of previous numbers.

Acute General Miliary Tuberculosis. By PROF. DR. CY. CORNET, Berlin and Reichenhall. Translated by F. S. TINKER, B.A., M.B., B.C., G.R.C.S., L.R.C.P.; late Senior Resident and Ophthalmic Assistant to the Royal Infirmary, Liverpool. Octavo; 107 pages. New York: PAUL B. HOEBER, 1914.

This is a very satisfactory review of the subject, written in a didactic style. There is a fair bibliography at the end of the book, but it does not include many references in the text.

A Manual of Biological Therapeutics. Duodecimo; 174 pages; illustrated. Press of PARKE, DAVIS & COMPANY, 1914.

Intended, as it is, to introduce to the reader the fundamental principles of biological therapy, this little book, issued by Parke, Davis and Company, admirably fulfils its purpose. The method of preparation of the various sera and vaccines manufactured by this company, is carefully described, and the indications and dosage of each given. There is also a chapter devoted to sero-diagnosis in which the Widal reaction and complement fixation tests are described, and a detailed account of the use of tuberculin is given.

Progress in Surgery

A Résumé of Recent Literature.

The Damage done by Pyelography. E. L. KEYES, JR., and H. MOHAN, New York. *American Journal of Medical Sciences*, January, 1915.

1. Momentary gentle distention of the normal pelvis of the kidney doubtless causes no more damage than a congestion of the organ (Experiments 1 and 3), which congestion is doubtless of brief duration.

2. But if the distention persists for a few minutes the injected fluid is absorbed into the blood-vessels and lymph spaces about the kidney pelvis.

3. Although, like Strassmann, we have been unable to detect any collargol forced into the collecting tubules;

4. Nevertheless, we have found collargol in the glomeruli and in the convoluted tubules.

5. But inasmuch as there was much less collargol within the glomeruli and tubules than in the lymph spaces and vessels.

6. We conclude that the appearance of the collargol within the glomeruli and tubules is a secretory phenomenon.

7. In actual practice we have to consider a secondary infiltration due to renal retention following the examination.

8. This secondary distension is of far greater importance than the primary retention at the time of injection.

9. Secondary retention is the cause of most of the deaths that have been reported from pyelography.

10. The cause of infiltration in these cases is ureteral obstruction. Hence it may occur when there has been no primary distention.

11. Alarming symptoms following pyelography are to be relieved by immediate drainage of the kidney or nephrectomy.

12. The presence of collargol in the kidney parenchyma, as shown by radiograph or by operation, should not be a cause of apprehension, though it shows that the injection has been made with too much force.

13. The collargol may enter the general circulation and be distributed to the other kidney and elsewhere, in some instances at least, and yet no great harm result.

A Comparison of the Results of the Phenolsulphonophthalein Test of Renal Function with the Anatomical Changes Observed in the Kidneys at Necropsy. W. L. THAYER and R. R. SNOWDEN, *American Journal of Medical Sciences*, December, 1914.

These observations show, in severe chronic nephritis, a uniformly low 'phthalein output which, as a rule, in those instances not interrupted by an acute terminal process, decreases steadily up to the onset of uremia, and is nearly or wholly suppressed from a day or two to a month before death. Acute terminal processes which may be unsuspected clinically, are common, and here a sudden diminution in the elimination of 'phthalein may come on in cases where the percentage previously excreted is not so low as to appear menacing.

In not a single instance, and indeed not once in all the studies of the last five years, have we met with a case of severe chronic nephritis with a good 'phthalein elimination.

Chronic passive congestion (cardiac disease) results often in a considerable reduction in the two hours' elimination of 'phthalein. The results are very variable in individual cases. In marked decompensation the 'phthalein output may be reduced to but a trace in two hours; but the excretion is, as a rule, rapidly restored with the re-establishment of circulatory compensation.

These observations are in agreement with the experimental studies of Rowntree and Fitz.

In the few instances of chronic nephritis of moderate extent which are included among our cases the excretion of 'phthalein was uniformly considerably reduced. All

of these cases, however, were associated with chronic passive congestion of considerable extent, but the percentage of 'phthalein was lower than might have been expected with an uncomplicated passive congestion.

In one instance of acute nephritis and in one instance of pure amyloid disease the 'phthalein excretion was greatly reduced.

The cloudy swelling observed in acute infections was in some instances associated with considerable reduction in the 'phthalein output.

These observations then tend to support our previous impression that the phenolsulphonophthalein test of Rowntree and Geraghty is a procedure of considerable diagnostic and prognostic value, especially in the study of chronic nephritis.

Hemorrhage following Nephrotomies and its Treatment. (*Die Blutung nach Nephrotomien und ihre Bekämpfung.*) A. A. TSCHAIKA, St. Petersburg. *Deutsche Zeitschrift für Chirurgie*, November, 1914.

From the very early days of kidney surgery nephrotomy, as an operative procedure, found for itself a definite place with rather clear cut indications to me. Irrespective of the direction of the incision into the kidney, whether longitudinal or transverse, or confined to upper or lower pole—nephrotomy, not infrequently, produced hemorrhage of a serious order. To combat this possibility for hemorrhage, various means were employed; of these the so-called deep "parenchymatous suture" and the well-placed mattress suture remained the best. A careful histological consideration of kidneys so sutured showed, however, that the suture proper caused greater and wider spread kidney damage than the injury given the renal parenchyma by the incision itself. Rabbits and dogs after nephrotomy and renal suture showed subsequently marked dilatation of the tubules with degenerative and atrophic changes in the tubular structures. The pyramids so compromised underwent cystic changes, while the extensive scar formation replaced much previously functioning parenchyma. The mattress suture gave the greater changes.

From this consideration Tschaika turned to ascertaining the value of the method advocated by his chief, Fedoroff, who tamponed the renal incision with perirenal fat. By animal experimentation the author learned that such a procedure yielded distinct hemostatic value. Not only could hemorrhage be arrested, but the fat underwent partial histologic changes and did not produce the marked kidney destruction observed after the use of sutures. Fedoroff had only six cases to report, but even in this short series the value of the method was evident.

The Treatment of Chronic Pyelitis. J. T. GERAGHTY, Baltimore. *Journal of the American Medical Association*, December 19, 1914.

Geraghty says it is surprising how slowly the profession has appreciated the advantage of lavage in the treatment of chronic pyelitis. The success of this is largely dependent on thorough examination and accurate diagnosis. Most cases are secondary to the infection of the kidney parenchyma or a part of a pyelonephritis. These latter are not discussed in the paper. The majority of non-tuberculous kidney infections are undoubtedly secondary to some predisposing factor, such as stone, tumor, stricture or other mechanical obstruction, and the amelioration or the cure is dependent on the removal of the cause. It is surprising, Geraghty says, how frequently even a severe infection of the kidney and pelvis will disappear when these factors are removed. The diagnosis of simple pyelitis from pyelonephritis is practically impossible except by the use of functional estimation. In the latter the function will be decreased, while in pure pyelitis no reduction in function will be seen. Of course, one cannot always exclude a slight degree of pyelonephritis not reducing function, and occasionally a case occurs of diminished function from previously healed pyelonephritis. The presence or absence of albumin has been of only occasional value in his hands. Pyelography is useful as showing changes in the pelvis from infection, and may be of value also in prognosis. Geraghty finds the organism causing the infection has little to do with the prognosis.

When a case is proved to be simple pyelitis, renal lavage is instituted, and in these selected cases brilliant results have been obtained. Various solutions have been employed, but Geraghty has come to depend largely on nitrate of silver and liquor formaldehyd. Vaccines have proved of doubtful value, also hexamethylenamin, the value of which at the kidney level is slight. The cases in which lavage was used are grouped as follows: 1. Those in which the catheterized specimen showed a fairly active infection with normal function, and collargol shows very few changes in outline. In these cases the prognosis is very favorable. Adams begins with injections of from 5 to 10 c.c. of 0.5 per cent of silver nitrate, the tip of the catheter being rather low down in the ureter and the strength of the injection gradually increased. Three cases showing good results are reported. 2. In long-standing pelvic infections, with marked changes in the pelvic wall and very few leukocytes and an occasional bacterium in the catheterized specimen, the prognosis is not so favorable, and caution should be exercised in giving it as far as the eradication of the infection is concerned. 3. In infections of the kidney pelvis, with a certain amount of pelvic dilatation and varying amount of residual urine, lavage has been of comparatively little value, especially when the condition is largely of bacteriuria. Some improvement may be obtained, but the condition is not hopeful for complete cure. When nephrectomy is contra-indicated pelvic lavage should be tried for what benefit it can produce. In these infections with mild hydronephrosis silver nitrate seems less beneficial than solutions of liquor formaldehyd employed in strength of from 1:5,000 to 1:2,000. Under such conditions it is advisable to introduce a catheter in the pelvis of the kidney, so as to empty it completely of the residual urine.

The Role of Functional Kidney Tests and Preoperative and Postoperative Treatment in the Reduction of Prostatectomy Mortality. B. A. THOMAS, Philadelphia. *Journal American Medical Association*, November 28, 1914.

Thomas holds that more important than the quantitative urine output for kidney function tests is, what he styles, the *index of elimination*. This is determined by dividing the quantity of indigocarmine (the dye is administered previously intramuscularly, or intravenously) eliminated during the first hour by the quantity excreted during the third hour after injection. This proportion is of prime significance, and upon it the author bases his judgment as to the advisability of prostatectomy. He counsils against operating upon patients who have general systemic defects; men with cardiac lesions and high blood pressures are bad risks; for those who have already developed vesical atony he advises a preliminary course of catheter treatment.

After operation he employed cardiac and renal drugs, viz., digitalis, sparteine, diuretin, etc. The bladder is irrigated daily with weak silver solutions, fluids are urged per os, and hypodermoclysis is used liberally. The patient is made to sit up very early.

The method of surgical approach for prostatectomy, perineal or suprapubic, should depend upon each individual case. The cystoscope is of invaluable aid in determining the type of operation best suited for each instance.

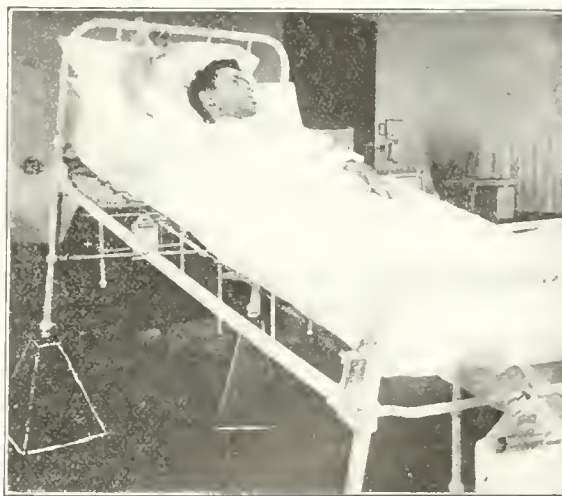
A Method of Diminishing Hemorrhage after Suprapubic Prostatectomy. EDWARD L. KEYES, JR., New York. *Journal of the American Medical Association*, December 19, 1914.

Keyes describes his technic in prostatectomy with special reference to hemorrhage. He exposes the bladder by suprapubic incision and enucleates the prostate between two fingers in the rectum and two fingers in the bladder. A curved staff is inserted into the rectum and a long Peaslee or Reverdin needle, threaded with a piece of catgut 18 inches long, is plunged along the groove of the staff into the perineum and passed along it until it can be felt in the bladder. The staff is then withdrawn, two Walker bladder retractors introduced to elevate the torn edges of the bladder neck and make it plain to the exploring finger. The needle carrying the catgut is inserted through the edge of the bladder neck just deep enough to

get a good hold at the lateral angle. Then the eye of the needle is brought up into the suprapubic wound and the catgut disengaged. The needle is then withdrawn from the puncture in the bladder neck and reintroduced at a corresponding point on the opposite side and again threaded with the catgut, allowing plenty of slack, and rapidly withdrawn through the perineum. If an indwelling catheter is to be used it must be now introduced. After the needle has been withdrawn we have a suture, both ends passing through a single puncture in the perineum, passing through the deep urethra and to the bladder neck and catching its lower segment at its two angles. Traction on the end of the bladder loop pulls the end down into the urethra; it thus controls hemorrhage mainly, Keyes thinks, by tension on the bladder neck. After the bladder neck has been firmly pulled down, the two ends of the suture are tied about a short rubber tube laid against the perineum. Drainage is provided for through the usual suprapubic tube or by a catheter in the urethra, or both. The suture is divided and withdrawn eighteen to twenty-four hours later. By this technic the immediate hemorrhage has been promptly checked and the ultimate bleeding made much less than it would otherwise have been. He has not had any fistula or inflammatory complications along the line of the suture in the perineum. The article is illustrated.

A Simple, Easily Regulable Method of Applying Abduction in the Treatment of Shoulder Disability. WALTER M. BRICKNER, New York. *Medical Record*, January 2, 1915.

Although the importance has been learned of early abduction after reducing fractures and dislocations of the head of the humerus, Brickner says that the very great value of abduction in the treatment of shoulder disability ("stiff and painful shoulder") has not been sufficiently



recognized. He refers to clumsy abduction splints that have been used, and points out that they not only are awkward, but that they provide no ready means of frequently regulating and gradually increasing the abduction.

The simple abduction method shown in the picture Brickner employs very often in the treatment of shoulder disability—both in early cases to prevent, and in late cases to cure, the stiffness and loss of motion, e.g., in disability arising from sprains, and in such cases of subacromial bursitis as do not require operation, and, especially, when not associated with injury to, and lime deposit in the supraspinatus tendon. He also used it successfully in three successive cases of forward subluxation of the head of the humerus, causing extreme shoulder disability.

The patient is put to bed in semi-recumbent position, supported on pillows, not too soft. He abducts the affected arm, on the pillow, as far as he comfortably can. A muslin bandage is then looped lightly about the wrist and carried to a convenient spot on the headpiece of the bed, where it is fastened. The upper end of the bed is

then raised on "shock blocks" or chairs. As the patient's body little by little slides down in bed his arm travels (relatively) further and further up; and thus a shoulder that obstinately resists forceable efforts at abduction yields steadily, painlessly, to this gradual countertraction, which the patient often does not even feel. It is striking to observe that a person whose shoulder for months has not been abducted, actively or passively, beyond forty-five degrees, put thus to bed in the afternoon, may be found the next morning with his arm alongside his head! Few cases respond so quickly, however. The treatment may require a week or more to restore full abduction.

The procedure can be variously modified:

Instead of fastening the bandage sling to the head of the bed, it may, in the daytime, be looped over the cross-bar (or a pulley) and carried down to the opposite hand, and the patient allowed to amuse himself by pulling upon it from time to time, which will hasten the results in suitable cases.

In those instances in which the condition does not demand, or the patient will not consent to continuous treatment, it may be employed only at night. It may be applied also, but not so satisfactorily, in a large reclining chair.

If continued abduction grows painful or irksome it may be intermitted from time to time, the patient merely slipping his wrist out of the bandage loop and resting the arm on a pillow or by his side.

A back-rest may be substituted, if for any reason preferable to the exaggerated Fowler's position.

Pillows may be piled up comfortably under the arm as auxiliary to or, from time to time, substitute for the sling.

In many cases of shoulder disability there is limitation of external rotation. In such cases the forearm will not drop back on the pillow in the plane of the body, and it should be supported on a small additional pillow placed behind it. This device is desirable sometimes in other cases merely to relieve the fatigue of continued rotation.

If, when the patient slides down as far as the bed will allow, the arm is not fully abducted, he should prop himself up again, and shorten the sling or apply it at the elbow.

All of these adjustments can be made by the patient himself, and no special attendant is needed.

This plan of treatment is not advised for recent fractures or complete dislocations (where moderate, fixed abduction is required), for arthritic conditions, nor for any shoulder disability until as definite a diagnosis as possible is established by all available means. In cases of adhesive subacromial bursitis with calcareous deposit in or on the injured supra- or infraspinatus tendon, Brickner says that open operation will yield more speedy results. At any rate, in such of these cases as may be submitted to this gradual abduction treatment, if it aggravates the pain or fails to promptly increase the arc of motion, it should be abandoned for a more radical measure.

The Operative Treatment of Contracted and Deformed Hands in Multiple Arthritis. G. R. ELLIOT, New York, *New York Medical Journal*, November 14, 1914.

Elliot recommends that radical treatment be employed only when the process is quiescent. The operation consists in forcibly reducing under anesthesia the displacements of the fingers. If hyperextension exists the finger is hyperflexed and vice versa. In some cases an open operation may be necessary, but this measure Elliot finds is only rarely necessary. After the manipulation, the hand is kept in splints padded in such a manner as to keep up a continuous correction of the deformity. Each joint is wrapped in gauze moistened in a solution of aconite, belladonna and glycerin. The pain is intense for the first three or four days, requiring sedatives. The splint is continued for two weeks and the wet dressing is left off when the reaction has subsided. The results have been very satisfactory and thus far no recurrences have taken place.

The Significance of the Jackson Veil. DANIEL N. EISENBRATH and E. W. SCHNOOR, Chicago, *Annals of Surgery*, November, 1914.

The authors, in a well planned and presented study which included observations during operations, dissec-

tions of the cadaver, and examination of ten fetuses, maintain that the parietocolic fold of Jönnesco (pericolic membranes or Jackson veil) is a *constant* fold of peritoneum found during fetal and postnatal life. This membrane is finely translucent, as a rule, but may become greatly thickened; its vascularity may vary so that some cases present but a few fine capillaries, while in other instances the membrane shows a marked vascular supply. Almost invariably the right parietocolic fold has its upper border at the level of the hepatic flexure, its lower border about one or one and a half inches above the lower end of the cecum—this lower border may fuse with the fold of Treves. Where the membrane is of the description just cited, it should not be stripped off under any pretext, since this structure represents the persistence of a fetal membranous layer whose operative removal would leave an extensive raw surface. In contradistinction, however, to this innocent form of pericolic band there is also the type which produces the definite pathological picture of colonic constriction (Lane's kink) with its attending clinical symptoms. Here operative interference is indicated. The authors assert that in the majority of instances the membrane is a *normal* structure. They claim, too, that, with Gray and Anderson, they have noted in the fetal cadaver a constant left parietocolic fold.

Injuries to the Bowel from Shell and Bullet Wounds.

P. LOCKHART MUMMERY, London. *British Medical Journal*, November 28, 1914.

As the result of observations made upon many injuries of the intestine noted in the present war, Mummery concludes that the patient should not be immediately operated upon, even if proper surgical facilities are available. The best treatment is a complete rest, absence of food and liberal administration of morphine. Surgical treatment should be reserved for the treatment of later and secondary complications.

The Subcutaneous Injection of Oxygen as a Therapeutic Measure. JOHN McCRAE, Montreal. *American Journal of Medical Sciences*, December, 1914.

McCrae injects the oxygen from the tank directly into the subcutaneous tissue, usually of the upper thorax. He does not measure the quantity accurately, but he recommends that the injection is continued until a lump, half the size of a football, is raised. The absorption occurs rapidly, so that in a few minutes the mass will have disappeared. McCrae reports a case in which he believes the injection unquestionably saved life. This case was a man, aged thirty years, who had undergone resection of the bowel for new growth. Three hours after the operation he appeared to be dying; he had edema of the lungs with rapid respiration, and McCrae did not believe he would live a quarter of an hour. He was given four large injections during three hours and the improvement was immediate. In pneumonia the results were disappointing. McCrae recommends the injection on the following conditions:

1. Accidents from anesthesia.
2. Edema of the lungs, edema of the glottis, and accidental interference with respiration by disease of the upper part of the respiratory tract.
3. Marked dyspnea with defective oxygenation, as in cardiac and renal disease.
4. Asphyxia of infants at birth.
5. Syncope.
6. Electrocutation.

A New Method for the Control of Post-Anesthetic Nausea. J. E. LUMBARD, New York. *Medical Record*, December 19, 1914.

Believing that nausea following anesthesia is due to the smell of the anesthetic, Lumbard has devised a simple method whereby a piece of gauze impregnated with perfume is attached to the patient's nose after the anesthetic has been administered. Lumbard claims that the method is highly efficient in preventing nausea. The selection of the perfume depends upon the likings of the patient. In the author's practice, he prefers the oil of bitter orange peel.

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RESULTS OF SOME FRACTURE OPERATIONS.

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The measures that have to be adopted in the case of malunited and ununited fractures are important for two reasons: first, because malunion, and by that I mean union of the fragments in such a relationship to one another as to materially impair the functional activity of the individual, and non-union of the fragments with consequent disability repre-

sented from gross carelessness of the necessary technic on the part of the surgeon who is solely responsible for the failure of his methods of treatment. It is useless for that surgeon to blame the plates or his assistants, presuming he has control of the arrangements and that he is working in his own theater. There are some occasions in which a man is required to perform operations in unfavorable circumstances and with assistants who are imperfectly trained, and these conditions may offer some excuse for failure, but when it is necessary to remove a plate after an operation for simple



Fig. 1.



Fig. 2.

sent the failure of their treatment by means other than operative: second, because the difficulties that these operations present are enormously in excess of those met in the primary treatment of these injuries.

Nothing can be more disappointing than the results of the operative treatment of simple fractures by many surgeons, most of whom would appear to possess sufficient skill and surgical cleanliness to perform the ordinary operations of every-day life with a reasonable amount of success.

When we are told that the surgeon has to remove a certain proportion of steel plates after operations for simple fractures, we realize that this has re-

fracture performed in circumstances that ought to guarantee a successful result, the operator should see to his technic and should not be satisfied till he has succeeded in excluding these avoidable failures absolutely from his practice.

I have had many opportunities of seeing fractures that have been operated on unsuccessfully and have not been surprised at the unsatisfactory results obtained.

These failures were due to a want of observation of the simplest rules by which asepsis can always be ensured. They were also brought about by a deficient knowledge of the simplest mechanical principles and to a want of skill and ingenuity. They

failed chiefly by the employment of excessive force, immensely powerful traction on the fragments being a great source of danger. An immense amount of force was substituted for skilful manipulation which is easily the most effectual means by which accurate apposition can be ensured. Another com-

latter the surgeon has merely to replace in accurate coaptation two broken surfaces and to retain them securely with or without a plate. The only insuperable obstacle to an accurate apposition of fragments in a simple fracture is excessive comminution of fragments, but in this case a satisfactory



Fig. 3.



Fig. 4.



Fig. 5.



Fig. 6.



Fig. 7.

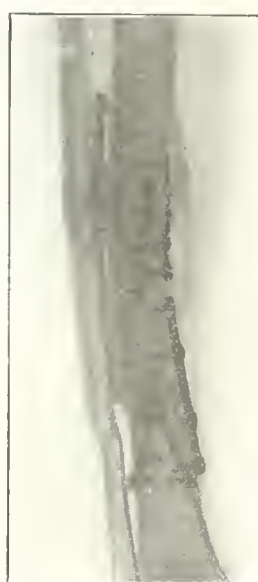


Fig. 8.

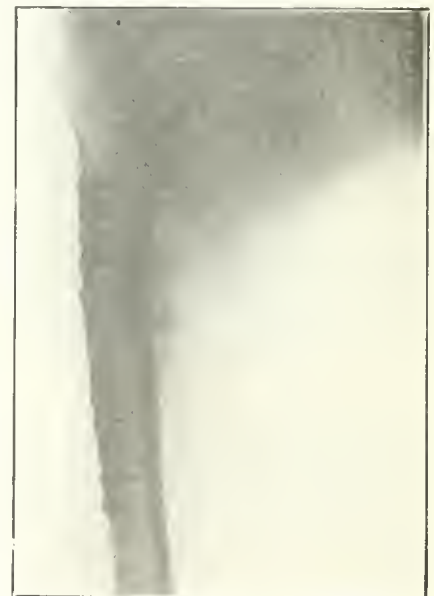


Fig. 9.

mon source of failure is to use ridiculously small plates. On principle one should employ the largest and the stoutest plates that circumstances permit.

In the case of mal-union or non-union of fragments the difficulties are very much greater than in the case of simple fractures. In dealing with the

result may usually be obtained by skilful handling. When the fragments have united to one another in a bad position it is necessary to divide the junction in such a way as to secure perfect alignment of the bones and to avoid any reduction of the normal length of the limb. To secure perfect alignment at

the cost of shortening of the bone renders the operation much less difficult, but this is a measure that a skilled surgeon would never adopt. Again, the union of fractures of two bones, such as the radius and ulna, in bad position, may accentuate the difficulties of accurate restoration of the fragments to

position that the limb was useless. This was due in part to the very considerable shortening and in part to the fact that not only did the axes of the fragments not correspond vertically, but they also formed with one another a large angle open inwards. A large piece of the shaft was also dis-



Fig. 10.



Fig. 12.

their relationship to one another, especially if a fracture is surrounded by very important nerves, as in that portion of the radius encircled by the supinator brevis.

placed downward, where it was united with the lower fragment.

In order to be able to bring two considerable sectional areas of the fragments into apposition, it

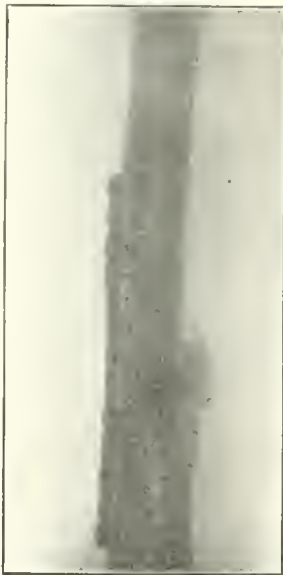


Fig. 11.



Fig. 13.

I. On February 1, 1910, a man, aged 46, fell in an aeroplane accident and sustained a very severe, comminuted fracture of the upper part of the shaft of his right femur. Union took place in such a

would have been necessary to shorten the limb by about four inches. Instead of this a small proportion of the circumference of the shaft of the lower fragment was placed in contact with a correspond-

ing surface of the upper, and they were retained in apposition by means of a very stout steel plate and screws.

As soon as possible the patient was gotten up on an ambulatory splint, devised by Mr. Hoefftche,

The condition of the fracture on May 25, 1911, is shown in figure 2.

11. Figure 3 represents an imperfectly united fracture of the tibia which came under my care ten weeks after the receipt of the injury. At the oper-



Fig. 14.

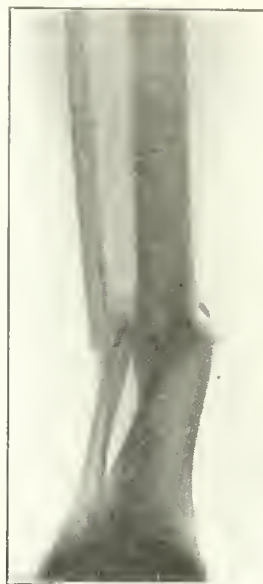


Fig. 16.

with the idea of gorging the extremity with blood, which brought about abundant callus formation, re-

ation, on February 6, 1912, the tibial fragments were secured in accurate apposition. Figure 4 shows the result of operation on May 2, 1912, when

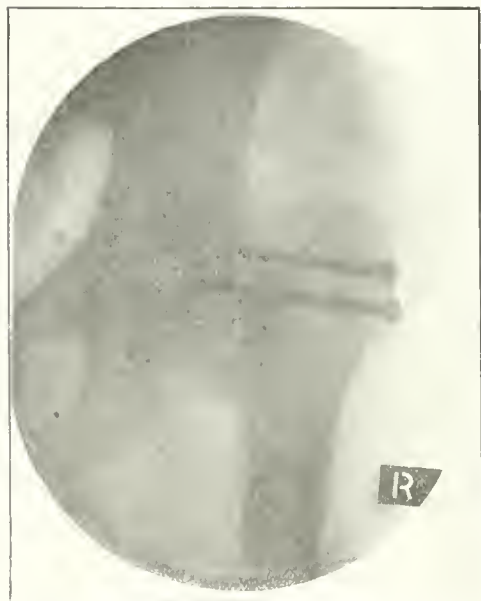


Fig. 15.



Fig. 17.

sulting from the crystallization in bone of the lines of force.

The patient's present condition is most satisfactory. He walks with hardly an appreciable limp.

the normal function of the leg was completely restored.

III. Figure 5 represents a very bad compound fracture which came under my care about ten weeks

after the injury. The bones were united in a very bad position. Extensive damage to the soft parts was the chief reason given for the very unsatisfactory result. Figure 6 shows the result of operation when the patient had regained full use of the limb.

IV. Figure 7 shows an ununited, comminuted fracture of the tibia and fibula about ten weeks after the accident. Figure 8 is a radiogram of the bone seven months after the operation. Although the patient was 56 years old, by getting him up and about on a Hoefftche's ambulatory splint one was able to obtain nearly as much crystallization of bone along the line of force as in the case of quite a young subject.

V. Figure 9 shows the result of an operation for mal-united fracture of the shaft of the femur ten months after it had been broken. The displacement of the fragments was very great and the union so insecure that it broke soon after the patient was allowed to walk.

This operation restored the femur to its original length and the patient to vigorous activity.

VI. Figure 10 shows the result of a fall in an aeroplane, and figure 11 the condition of the femur two months later, the result being perfect.

VII. Figure 12 shows a badly united fracture, the junction of the fragments allowing fairly free movement. The patient had been operated upon and a steel plate inserted. Suppuration followed and the surgeon had to remove the plate. Some of the fragments of broken screws can be seen in the radiogram.

I operated on November 25, 1913. Figure 13 shows the condition of the bone on April 9, 1914.

VIII. Figure 14 shows an ununited fracture of the neck of the femur, incapacitating the patient from following his normal active occupation; and figure 15 shows the result of operation when the patient, an officer, was able to resume duty.

IX. Figure 16 is a radiogram of a badly united fracture of the tibia and fibula which incapacitated the sufferer. Figure 17 shows the result of the operation, which restored the man to a life of activity.

These excellent radiograms were all made by Mr. W. A. Coldwell.

OPERATION FOR FRACTURE OF THE LARGER BONES.

Many surgeons have been teaching, and using, open operation almost as a routine practice in fractures of the larger bones. The result of this practice and teaching has been disastrous in the hands of those not well equipped for the work, and even the most expert have contributed their quota of bad results.—W. F. CARR in *The Virginia Medical Semi-Monthly*.

THE INLAY BONE GRAFT VERSUS LANE PLATES IN THE TREATMENT OF FRACTURES.*

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NEW YORK.

I am glad to have this opportunity of presenting the work I am doing with inlay-grafts as a substitute for the Lane plates in ununited and fresh fractures, and especially in comminuted fractures. I do not wish to be understood as recommending the inlay-graft for all cases of fracture any more than the Lane's plate is recommended. These operations are often done when not necessary. We should employ external means of reduction and fixation, and avoid an open operation whenever possible.

There are, however, certain cases where one is compelled to perform an open operation in order to secure a satisfactory functional limb.

I began bone transplantation work for Pott's disease and ununited fractures in 1911, using the chisel and mallet to obtain the graft. A year and a half ago, I began to develop an electro-motive equipment which is manufactured by Kny-Scheerer & Co., the advantages of which I shall outline. It is a small universal motor, and can be used with any electrical current, without readjustment. I have had occasion to use it with various electrical currents in Germany, France, and England; also upon a twenty-five cycle current transmitted into Canada from Niagara Falls, and, so far as I could determine, with approximately the same cutting force. It is most convenient to be always able to connect it to any electric light socket, with the certainty of obtaining a satisfactory current and without fear of damaging the motor. The electrical current is transmitted directly to the motor itself through a sterilizable wire cable on the end of which is a metal plunger which is inserted through a long sleeve on the shell. This is far more trustworthy than when the electrical wire is contacted with the outside of the sterilizable shell, necessitating a movable spring contact for transmitting the current through the shell to the motor (Hartley-Kenyon). The outfit is most reliable. The one I have has been employed in one hundred and seventy-five cases, and has not failed once.

*Read before the Association of New York and New England Railway Surgeons, October 22, 1914.

The automatic catch for holding the special attachments, such as the lathe, twin saw, drill, etc., is similar to the catch used by dentists, and is very easy of adjustment, and as far as I know is the first automatic catch to be incorporated into an electro-motive surgical outfit. It permits the cutting motor tools to be changed with almost the speed of hand instruments and is almost indispensable to rapid work in all osteoplastic operations, especially in fractures where so many different cutting tools are used. The shell is sterilized the same as the Hartley-Kenyon outfit. The shell, which entirely covers the motor, and the electric wire leading to it, are boiled, insuring perfect sterilization of every part of the outfit that is handled or comes near the field of operation. The lathe or doweling attachment—as well as all the cutting tools—is also boiled. The speed of rotation of the dowel cutters is reduced ten times by steel gears. Two of the most common cutters are always in place, for making round graft-nails or spikes. The smaller ones are used to hold inlay-grafts in place, or for other purposes for which metal screws would ordinarily be used; and the larger ones are used in fracture of the neck of the femur, in place of a metal spike.

I have, also, had constructed a very small saw which can be employed to advantage in deep cavities that are difficult to get at, such as laminectomies, etc. Fig. 1 is a cut of the latest model of my twin saw, which is far more satisfactory than the preceding models. Each of the saws is mounted on a separate shaft and can be used as a single saw. The shaft of one is made hollow, so that the shaft of the other can be inserted into it, with the saws at any distance apart, according to the size of the bone being operated and the width of the graft or gutter desired. The adjustment of the distance between the saws is managed by pushing the shaft of the distal saw into the hollow shaft of the proximal saw. The shafts are then locked in that position by placing a strong clamp, or better, the accompanying small wrench, on the flat-sided end of the hollow shaft (to prevent it from turning), while the surgeon turns the saw (on this same shaft) with a gauze sponge held over the teeth of the saw.

The motor outfit and these attachments are not absolutely necessary, but it is a great advantage to have them, as a large percentage of graft and bone plastic work can be done more exactly and quickly, and with better results. This is especially true in fracture work.

There is much discussion as to the exact rôle

which an autogenous bone graft plays, but, as no one has questioned its reliability as a surgical agent, the discussion is really an academic one. The autogenous bone graft is most reliable, and if there is no infection and primary union of tissue is secured, close to 100 per cent of good results will be obtained.

Fig. 4 is the skiagram of a most interesting case in which two grafts were inserted to restore two-thirds of the tibial shaft which had been removed for sarcoma. This case was operated upon, by the writer, at a clinic held at Grand Rapids, Mich., in February, 1913. The family were very reluctant to give permission for operation and would only consent to a plastic operation, not an amputation. We found that the tumor had involved the popliteal space, and complete removal was impossible. About two-thirds of the tibia—at its middle and upper portions—was removed. A graft six inches long was removed from the crest of the tibia, and on account of the evident necessity of later amputation of the leg, a graft of small diameter was obtained, and in attempting to adjust it in place it was accidentally broken into two equal fragments. The broken ends of these graft fragments were inserted into the upper and lower tibial fragments by the inlay method, and were contacted one with the other in the centre of the leg.

Later, the family gave permission for the amputation, and the specimen was kindly obtained for me by Drs. Fabian and Campbell, just four weeks after the grafts were inserted. Strong and complete bony union had occurred notwithstanding the fact that the diameter of the grafts above and below the point of union had not changed. The bony union between these fragmentary grafts is at so great a distance from any other bone, which could have furnished osteogenetic cells, that there is not a shadow of a doubt that the callous formation came from the active osteogenesis of the grafts themselves.

This specimen demonstrates conclusively that the graft does act as a true graft in certain instances. In all bone grafts which are properly inserted a certain varying number of the peripheral and central cells live and proliferate, and a varying part of the central portion of the graft acts as an osteo-conductive scaffold. In favorable subjects, the entire graft may retain its viability, especially where the graft is inserted by the most ideal technic—namely, by the inlay method, which brings into close apposition each of the four elements or layers of the graft to

their corresponding elements in the recipient bone (i. e., periosteum, compact bone, endosteum, and marrow substance).

Now, I wish to emphasize the action of Wolff's law in its application to bone grafts. Even if fracture fragments are in contact, Wolff's law has its influence and causes a proliferation and enlargement of the diameter of the graft and a consequent filling in between ends of the fragments and union of the fracture. In a comparative way, the graft is still more efficacious in gunshot or other fractures where there is comminution or

months, if the skiagram can be trusted. Thus it is seen that Wolff's law has to do with function, and is operable in fragments of bone as well as complete skeletal bones, and has an important bearing upon the plan of treatment and the progress of convalescence in a very large portion of bone and joint work.

This paper is based on over 350 bone graft operations of different kinds—in over three hundred of which the graft was removed from the patient's own tibia.

Of the three hundred cases where the graft was

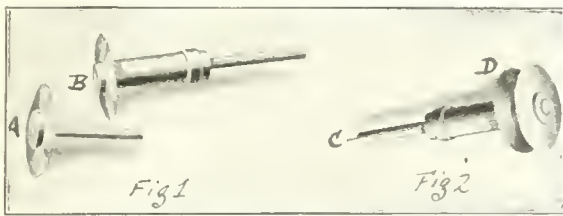


Fig. 1-a is cut of author's adjustable twin saw with the individual saws separated, either of which can be used as a single saw. When it is desirable to use them as a twin saw, the shaft of the one to the left (a) is inserted into the hollow portion of the shaft of the saw to the right at B, as represented in Fig. 2. The distance of the saws apart is adjusted as required by caliper measurements. The saws are then locked firmly together by placing the accompanying small wrench or a strong clamp on the flat end of the shaft at C, and turning the saw D (covered with sterile sponge) with right hand. This is done quickly and causes the shaft of the distal saw (a) to be grasped by a compression ring in the hollow shaft of the proximal saw (see Fig. 2). The saws are released from each other by turning proximal saw in opposite direction.

When these saws are in place in motor and in action they are covered with a spray-guard which not only furnishes a constant spray of salt solution on the saws to keep them from heating but prevents the flying of the solution from the centrifugal action of saw.

loss of bone substance from infection, and consequent sequestration. In such cases the graft spans a hiatus and its proliferation fills in the space, thus restoring the length and strength of the fractured bone.

A good illustration of the influence of Wolff's law is where a portion of the tibia has been destroyed by osteomyelitis and removed. Without the support of the tibia, the use of the leg causes an abnormal amount of stress both from weight-bearing and muscular pull to be borne by the fibula, which hypertrophies up to a strength commensurate with this added strain. The same thing happens to a graft, which is not of sufficient diameter to withstand the stress that comes upon it—it proliferates to an adequate size. Again, the tibia or bone from which the graft has been removed proliferates until it becomes the same size and strength that it was before the graft was removed; and this occurs in about two to four

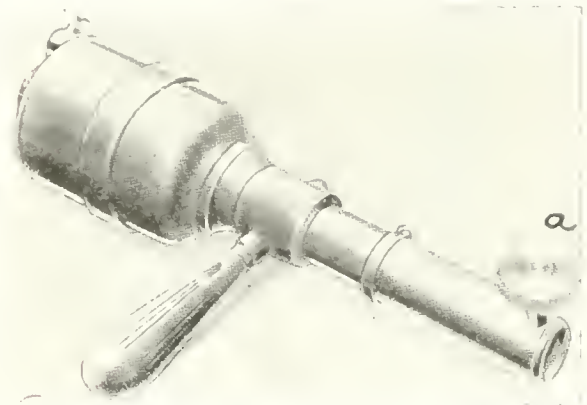


Fig. 3 is author's motor, and the shells which cover it are sterilized by boiling (Hartley Kenyon method). A is author's right angled twin saw, devised to enable the surgeon to perform inlay graft work in deep wounds and difficult regions to get at.

obtained from the tibia, in no instance has there been any trouble with the tibia from which the bone was removed. Of 44 cases of ununited fractures which I have operated upon by the inlay graft method, 19 had been previously plated. In reference to these statistics, I wish to advance a further statement. A metal plate placed on a fracture inhibits seriously, as a rule, the callus formation on that side of the fragment at the same time that osteogenesis may be active on the other side of the fragments, and in a certain percentage of cases the inhibition to callus formation is sufficient to result in non-union, even though there may have been no infection. There are few surgeons who execute Lane's technic, therefore infection occurs in a varying percentage of cases, which is a frequent cause of non-union. Apropos of this, Thomas has emphasized the unreliability of the Lane plate as used by a number of operators, and cites statistics of 450 fracture cases gathered by him at Cook County Hospital. It was found that it had been necessary to remove the Lane plates on account of suppuration or other causes in 48 per cent of the cases which had been plated.

In every case of non-union which has existed for any length of time from any cause whatsoever—whether from soft tissue between the fragments, local infection, systemic disease, idiosyncrasy in lack of osteogenesis, or from the inhibitory influence to bone growth from a Lane's plate or other metal appliance; there is always a distinct pathological change in the fragment ends, consisting in diminution of and degeneration of bone cells and a coincident increase of calcium salts, or, in other words, a sclerosis. This eburnated area may extend as much as one and a half inches into each fragment, and osteogenesis is greatly impaired—so much so that bone fragments ideally contacted and perfectly immobilized by external splints or internal metal devices do not unite. In other words, it is clear that the surgical problem which presents itself is not the securing of better fixation and a more close approximation of the fragment ends by bone removal and freshening, but the furnishing of an efficient internal splint and at the same time a bone-growing and osteo-conductive element which spans these sclerosed areas and is at the same time closely and favorably contacted with the healthy vascular osteogenetic bone in each fragment beyond the eburnated area and distal to the point of fracture. The inlay-bone graft fulfills all these requirements and even more, in that, it acts as a strong stimulus to osteogenesis on the part of the host fragments themselves.

In fresh fractures, the graft material can practically always be taken from the fragments themselves, as the osteogenesis of this bone has not become impaired. In most of our latter cases of non-union the graft material has also been taken from the fragments, with uniform success. In such cases, however, the inlay insert should always, when possible, be obtained from the upper fragment and slid downward into the distal fragment. This is important, on account of the large amount of rarefaction which always appears in the distal fragment of a pseudo-arthritis of long standing, and the relatively smaller amount of osteoporosis in the proximal fragment.

The Author's inlay technic varies somewhat according to individual cases and requirements. In small bones, such as those of the forearm, the inlay is best held in place by kangaroo tendon either placed in drill holes to the side of the groove or wrapped completely about the bone. In fresh fractures of the large bones, such as the femur, where marrow cavity has not become filled with new-formed bone and there is nothing to

prevent the inlay from slipping into the marrow cavity, the graft and gutter beds are made wider at their periphery than at the marrow side. With the fractured fragments held in proper alignment, the graft to be employed is usually removed from the fractured bone—generally the proximal fragment—and then slid distally into a groove one-half its length which has been prepared for it in the distal fragment. In a femur, the sliding inlay should be about five to six inches long. The removal of both long and short grafts is started by making parallel cuts $1/32$ to $1/16$ inch deep, with the twin saws adjusted at a suitable distance apart, depending upon the size of graft and gutter to be formed. The purpose is to outline a graft of uniform width throughout its whole extent. These parallel saw cuts are then continued through the cortex to the medullary cavity with

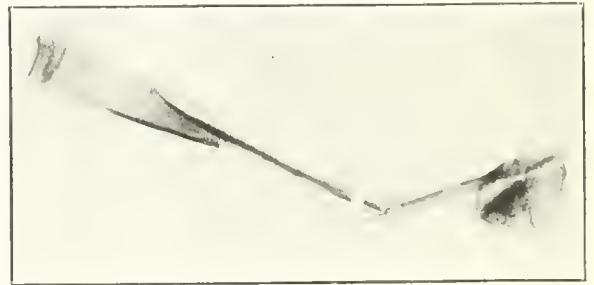


Fig. 4.

the single motor saw, held at such an angle as to cause the cuts to converge in approaching the medullary cavity, in order to prevent the graft, when pressed tightly into position, from slipping into the medullary cavity. The ends of the grafts are freed with transverse cuts made with either a very small motor saw or a narrow chisel. The thickness of the saw-blade makes sufficient difference in the size of the graft and gutter to allow the inlay, when slid into position, to sink slightly below the borders of the gutter, thus furnishing a margin of the guttersides above the graft into which holes are drilled obliquely to receive the autogenous dowel-pegs.

The inlay, which has a wedge-shaped cross-section, is pressed tightly into position and held there firmly by either a Lowman or a Berg clamp while the holes are drilled and the dowel-pegs inserted. It may be necessary or wise to allow the drill to sink a fraction of, or its whole, diameter into the edge of the graft. The pegs are obtained by splitting the short segment (removed from the distal fragment for the purpose of making the groove for the inlay) into two or three fragments, and pushing them through the author's motor

lathe or doweling instrument. Each of these dowels, which is long enough to make two or three fixation pegs, is driven lightly into the holes over the inlay and while an assistant holds its distal end with a forceps, the surgeon cuts it with the small motor saw at the desired place. The remaining portion of the dowel is then used in like manner for additional pegs.

In ununited fractures of large bones, where the marrow cavity is filled with a bone plug which prevents the inlay from slipping into the medullary canal, and in all the smaller bones and all individual cases where the mechanics are favorable, the twin motor saw alone is used in removing the inlay graft and preparing its gutter bed. In fractures of long bones where the difficulty of fixation is great, the inlay is held in place by the bone graft pegs or heavy kangaroo tendon, or both, as seems best. The fragments are motor-drilled on each side of the gutter, and the tendon is placed as indicated by the diagram. When the graft and its gutter-bed are formed by the twin-saw, the graft is just twice the thickness of a saw cut narrower than its bed, which allows space for heavy strands of kangaroo tendon to be placed between the graft and gutter-wall on each side. (See Fig. 6D.)

In the case of small bones, such as the radius or ulna, the encircling of the fragments with the tendon is very efficacious in holding the insert firmly in place. In severe comminuted fractures from gunshots or other causes, where there is a space to be spanned and the length of the limb maintained by the inlay, it is best to tongue and groove the ends of the graft and bone cortex of gutter ends. The groove should be in the end of the graft, and the tongue in the gutter-ends. Any tendency to shortening of the limb by muscular pull, etc., causes the tongue and groove joints to become all the more firmly locked and is thus a sure preventive of shortening. The graft, however small, will in time hypertrophy, under the action of Wolff's law, and will become the size and strength of the bone whose substance it is supplying. The value of the graft in this type of cases cannot be overestimated.

An important point in the technic of bone grafting in its application to all types of fractures is the sufficient length of the transplant. In the case of the intramedullary graft this may afford a great deal of difficulty, but with the inlay method it is accomplished with ease. A graft six inches long can be inlaid as easily as one two inches in length. Several unsuccessful results

have come to me in which I am sure the contributing causes of failure were the shortness of the graft, the intramedullary method, and the fact that it did not extend sufficiently beyond the sclerosed fragment ends to afford adequate and exact contact with vascular-osteogenetic bone. In one of these cases, the inlay graft had been used, but the technic had been most defective and the unsuccessful result was not astonishing. The case was a long-standing ununited fracture, with

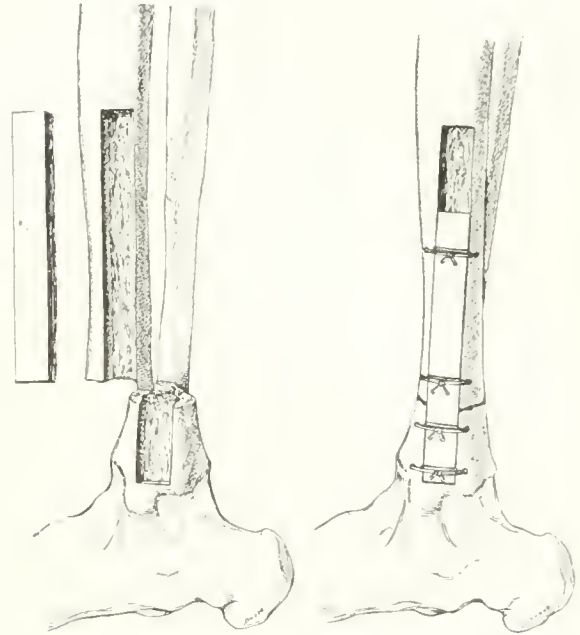


Fig. 5 is a schematic drawing from an actual case, of an ununited fracture of the tibia of one year duration, with a marked displacement of the lower fragment backward in a woman weighing 250 pounds. The bone ends were freshened and sufficient bone removed with motor and hand tools to allow the reduction of the fragments. On account of the strong tendency to a relapse of the lower fragment backward, the inlay graft was slid down on the inner side of the tibia, so that it prevented a relapse of the displacement by virtue of its inherent inlay mechanics. If the inlay had been placed in the anterior surfaces of the fragments the displacement would have been prevented wholly by the sutures which held it in place and would not have been so trustworthy. The lower fragment was short, therefore the inlay was extended completely to the tip of the malleolus so as to obtain as extensive contact and firm fixation of this fragment as possible. In this instance if the lower fragment should be so short or pathologically changed that bony union with graft should not be secured there would still be malleolar joint support from the lower end of the graft, providing the graft united with the upper fragment which can be assured by a very long contact. The inlay technic is especially adapted to fractures near joints in that the graft can be extended completely to nearby joints.

marked sclerosis of bone, extending into each fragment for about one and a quarter inches, as shown by the X-ray. The graft insert was only about two inches long and did not even extend through eburnated bone. The graft should have been not less than five inches long, thus extending well into the osteogenetic bone of both fragments

beyond the sclerosed area. This is an important technical point, and cannot be too strongly emphasized.

Four of my present series of ununited fractures had previously been unsuccessfully operated upon by the intramedullary technic, which, I believe, is largely explained by the fact that this tech-

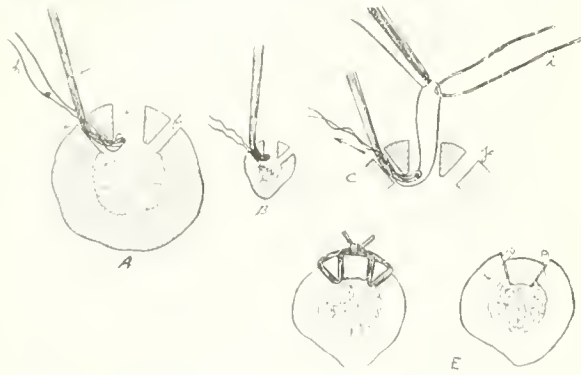


Fig 6. These drawings illustrate the technic of fixing the inlay graft in place where kangaroo tendon is used for that purpose. A represents the cross-section of a large bone which has been guttered at (e) for the reception of the inlay and drilled at f f for the tendon. G is the eye end of a proper sized curved needle or the author's special flexible instrument bent for this sized bone, into which has been threaded a loop of strong black silk.

B is a smaller bone with a smaller curved needle or the threading instrument bent more acutely for the smaller bone in the drill hole. The drawing (c) represents the loop of silk pulled upward from the gutter and the end of the kangaroo tendon (i) placed through it. The needle or threading instrument, the silk thread and the kangaroo tendon are pulled back through the drill hole in direction of arrow. The same procedure is repeated at (j) for the purpose of pulling through the other end of kangaroo tendon. This technic can be readily practiced in the most inaccessible wounds. Many times the tendon is stiff enough so that it can be pushed through the drill holes without the aid of anything, of sometimes when the drill holes are in a suitable relationship to each other a curved needle threaded with the tendon can be passed through both drill holes at the same time. D represents the kangaroo tendon in place over the graft and tied. If the marrow cavity of the fractured bone is large and not filled with firm bone as in the case of a fresh fracture, then two strands of the tendon can be placed through the drill holes and one left beneath the graft to prevent it displacing into the marrow cavity. It may at any time be deemed advisable to supplement the kangaroo tendon with bone graft peg for fixing the graft in place. The pegs are used in all fresh fractures of large single bones where the problem of fixation is difficult. The graft gutter is made with converging walls so that the graft will wedge in firmly and cannot displace into marrow cavity. See drawing, Fig. 5-E. In this instance the gutter and sliding graft is made by outlining them with twin saws which is allowed to cut into the surface of the bone about 1/32 inches. This determines the uniform width of the graft and gutter, the cuts are then changed to converging ones and are completed to the marrow cavity with the single motor saw.

nic does not afford an ideal histological contact of graft to host fragments, even when well executed.

Two important advantages of the inlay technic as applied to ununited fractures are: First, the ease with which sufficient contact with osteo-

genetic bone beyond the sclerosed area can be secured; and, second, the readiness with which this contact can be varied in accordance with the difficulties encountered. The more desperate the case and the more frequently it has been unsuccessfully operated upon, the longer must be the inlay transplant. One of my series—an ununited fracture of the radius and ulna—had been operated upon unsuccessfully seven times, including the use of Lane's plates, silver wire, nails and intramedullary grafts, and it was then pronounced impossible to secure union. The inlay grafts used were very long, extending to the tips of the styloid processes, and well beyond the eburnated area in the upper fragments. In five weeks' time there was firm union. The X-ray showed that all through there was firm union of graft to that portion of the distal fragment beyond the eburnated area. There was, however, no union between the fragments themselves or between the eburnated area in the ends of the fragments and the graft. The result would undoubtedly have been a failure had the graft inlays been short and had not extended well beyond the sclerosed areas of the fragment ends. Again, it would have been most difficult to have inserted medullary grafts without breaking the ulna graft while inserting the radial transplant, or vice versa. (A united fibula has been broken, to my knowledge, in attempting to insert the intramedullary graft into the tibia.) It would also have been most difficult to have reached and secured satisfactory contact with osteogenetic bone beyond the eburnated zone. This difficulty, however, is inherent in the intramedullary technic, and no doubt was largely responsible for the previous failure from this type of operation in this particular case.

A strong argument for the inlay technic is its universal applicability to all types of fractures of long bones, however near the joints they may be. A good illustration is an ununited fracture of the tibia in good apposition near the ankle joint, where the fibula has become united. The accessible portion of the fibrous union is removed. There is no occasion to disturb the relationship of the fragments. The thickened periosteum is split and peeled sidewise (on lower fragment only), and with the motor twin-saws and a narrow chisel a groove is made in the lower fragment completely to the tip of the malleolus, if the fragment is very short. Then, by means of the same twin saw, a cortical graft four or five inches long is removed from the upper fragment, and slid down into the groove, in the lower fragment.

When the fracture is very near a joint, as the ankle, and the lower fragment affords a very short contact, the graft can be extended to the tip of the malleolus, so that joint support will be largely supplied by the end of the graft which is in the malleolus as in a shell, even if by chance bony union should not occur between graft and lower fragment; provided, of course, that union has

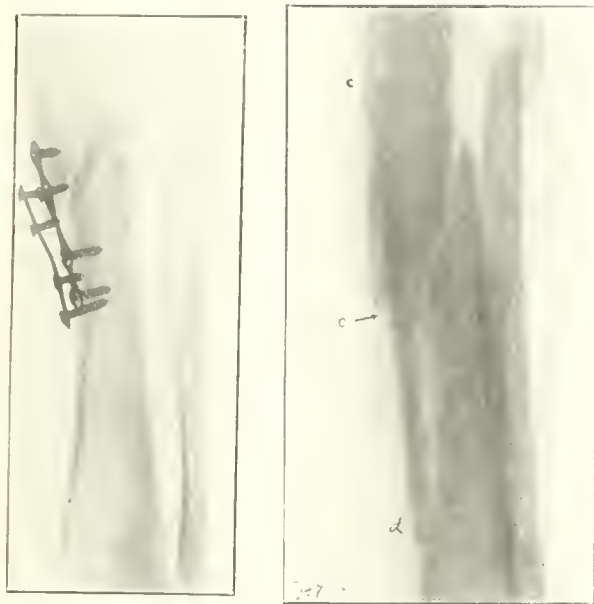


Fig. 7-A is a skiagraph of an ununited fracture of the tibia of eight months duration. Two Lane's plates were put on immediately after the fracture occurred and primary union of soft tissues and excellent apposition of the fragments were obtained as x-ray shows. Nevertheless, union did not occur, as has been observed in many other similarly plated cases. The metal plates were removed and an inlay graft (c d) 5 $\frac{1}{2}$ inches long slid down from the upper fragment as shown in skiagraph Fig 7-B. The arrow (c) indicates region between the fragment ends where a large number of small grafts were inserted. The screws were found disengaged from the bone and laying in large cavities in the bones. There was a large amount of bone destruction about the plates and screws. There was no callus formation whatsoever in the region of the metal. Bony union occurred almost immediately after the inlay graft. In five weeks' time the union was very firm and the limb is functioning normally, now nine months after graft operation. It is believed that in this case as well as many others that the metal plates contributed to non-union.

taken place between the upper fragment and the graft, which should be made certain by a long inlay and consequent extensive contact.

In exceptional instances there is no necessity for using any means of holding the graft in place.

To fix the inlay in place, the question arises of the choice for the purpose between bone pegs or heavy kangaroo tendon placed in drill holes or wrapped entirely around the bone when it is small, as the bones of the forearm.

An important mechanical feature of the inlay,

which should not be overlooked, is that if it is inserted in proper relationship to the forces which are causing displacement, it becomes by its own inherent mechanics a most effective fixation agent, irrespective of the means used to fix it in place. An illustrative case (see drawings, Fig. 7) was that of a one-year ununited fracture of the tibia (situated about one inch from the ankle joint) in a very stout woman. There was a marked displacement of the lower fragment and foot posteriorly. The bone ends were freshened and the lower fragment was forced forward into place. Although there was a strong tendency for this fragment to spring back into its old position, a long inlay placed into the inner side of the fragments held them securely, by virtue of the mechanics of the inlay, without depending upon the kangaroo tendon and the graft pegs which held it in place. On the other hand, if this inlay had been placed into the anterior or posterior surface of the tibial fragments, its fixation force would have been wholly dependent upon the pegs or tendon which held it in place.

I have repeatedly and successfully used the bone graft for spanning through tuberculous foci in Pott's disease of the spine, and tuberculosis of the ankle and knee joints. The cortical bone graft in my experience has always withstood pure tuberculous infection, providing it has a satisfactory contact with healthy bone on each side of the infected focus. It will also resist attenuated pyogenic infection under similar conditions, as has been proven by experiments conducted by Phemister and myself in both surgical usage and laboratory work.³ The importance of this fortunate property of the bone graft is readily apparent, in that it doubly assures its trustworthiness as a general surgical agent (when compared with metal). Especially is this true in its application to compound fractures in which infection is feared, or where a mild infection has already occurred. The following is an illustrative case.

A man forty-five years of age came to me with an infected ununited fracture of the tibia of six months' duration, and gave the following history: Six months previously he had sustained a fracture of the lower third of the tibia and fibula. The tibia was immediately plated with two long Lane's plates. Infection occurred, and the plates were removed in three weeks' time. The wound continued to discharge profusely, and an X-ray examination revealed a sequestration of the com-

³(See Albree: Experimental Study of Bone Growth and the Spiral Bone Transplant. Jour. A. M. A., April 5, 1913, Vol. IX, pp. 1844-49.)

plete diameter of the upper fragment of the tibia, from the upper screw-holes of the Lane plates down to the end of the fragment. The discharging sinus was increased in size, and the sequestrum—about two and a half inches long—comprising the entire diameter of the tibia, was removed. The cavity thus produced was packed, and the leg was put up in a plaster cast, making use of the united fibula to prevent approximation of the remaining tibial fragments and consequent shortening of the leg. At the end of eight weeks, the sinus was still discharging a considerable amount of sero-purulent material and on account of the large cavity between the fragment ends, the prognosis as to when the sinus would heal was most uncertain. As the patient was very anxious to have something done immediately to get a union of his tibia, I decided to make an attempt, and with the use of the motor twin saw I dragged a strong cortical graft down from the upper fragment into a groove made with the same instrument in the lower fragment. (The cavity was first curetted out carefully and filled with tincture of iodine (3½%), and the whole operating outfit was then changed.) The inlay was slid into place from the upper fragment and held with peg grafts, which were made on the operating table by splitting into three portions with the motor saw the fragment of bone removed from lower fragment in making the groove for the inlay, and then shaping these portions into three long pegs by means of my motor lathe. On account of the large size of the sinus, it was impossible to cover about an inch of the centre of the graft, where it spanned across the sinus opening. However, much to our gratification, the convalescence was most satisfactory; granulations covered the exposed portion of the graft very rapidly, and there was firm union between transplant and fragments in six weeks' time. In twelve weeks' time, sufficient osteogenesis had occurred to make the tibia apparently as strong as ever.

I have also had even more striking experience in experimental graft work on the dog, which demonstrated still more conclusively the bacteria-resisting properties of the bone graft. Wounds have become virulently septic on the second and third days after operation, laying bare the graft which was bathed in pus at the bottom of the wound. Nevertheless, either a portion or whole of the grafts took and lived.

Whatever be the means of internal fixation, whether the Lane plate or the inlay graft, the

limb should be firmly immobilized in as near a neutral position as possible, i. e., a posture of the limb which causes the relaxation of those muscles which happen to have a displacing influence in that particular fracture. If this is done, inlay or peg grafts, Lane's plates or neck of femur spikes will not bend or break during the period of this external fixation. Weight bearing function and non-union or soft callus, and bone absorption are the causes of internal metal-fixation-splints yielding.

SUMMARY.

The bone graft is a trustworthy surgical agent, as proved by my uniform success in its employment in over 350 surgical cases; also by a careful study—microscopically, macroscopically, and by the x-ray—of its results when used experimentally, and in the presence of primary union and with mild infections, in human cases. The field of usefulness of the cortical graft is distinctly enhanced because of its resistance to tuberculous and attenuated pyogenic infection. Its field is also enlarged by the use of motor-driven instruments, such as circular saws of different sizes, the adjustable twin saw, and the lathe or dowel instrument with different adjustments for making, as conditions demand, various sizes of bone graft inlay, nails, or spikes. By the use of this motor outfit and its products, in conjunction with kangaroo tendon, I have during the past two years been able to entirely avoid the use of all metal in the form of screws, nails, Lane plates, wire, etc., for internal bone fixation purposes. This has been made possible largely by making the most of well-known fundamental mechanical devices, hitherto rarely, if at all, used in surgery, such as bone inlays, wedges, dowels, tongue-and-groove joints, mortices and dove-tail joints.

40 EAST FORTY-FIRST STREET.

DISEASE VS. AGE IN FRACTURE.

There will always be deaths following serious fractures in persons who are diseased. Age of itself does not affect the prognosis in any way. Just as good and prompt union occurs in men over 90 as in young men, provided they are not victims of nephritis, angina, excessive arteriosclerosis, or other advanced disease. The prognosis is grave, even in young persons, with diabetes, delirium tremens, advanced nephritis, epilepsy, or cardiac disease; and in all persons nearing the end from any disease the shock of a serious fracture may bring about a fatal termination.—W. P. CARR in the *Virginia Medical Semi-Monthly*.

NON-REDUCING OPERATIONS FOR FRACTURES AND DISLOCATIONS.

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The treatment of fractures has received much attention of late, and especially the operative methods. While the large majority of fractures and dislocations can be best treated by the closed method, there is a remaining four per cent. which require open operation. Such operations can be divided into four classes: (1) The open reduction of recent cases. (2) The open reduction of old cases. (3) Non-reducing operations. (4) Operations where some appliance is used which penetrates the bone and emerges through the skin.

A great deal has been written about the use of Lane plates, of bone grafts, and of Steinmann nails, etc., and whether or not a fracture should be reduced by the open method, or treated by the closed method. There is, however, a considerable field for operative measures for the relief of those fractures and dislocations which are not covered by the above procedures, and it is to these non-reducing operations that I would call attention. The majority of these are late cases, eighteen days or more after the injury. If seen early they will frequently come into the first class, where a reduction can be accomplished. Among 206 operations for fractures and dislocations, fifty-five have come under this heading.

By non-reducing operations are meant those where no reduction is tried, but by some other means the attempt is made to prevent or overcome the deformity, or impairment of function due to fracture or dislocation.

These again can be subdivided into groups:

First.—*The removal of loose fragments.* If these press on the skin, the vessels, or nerves, or by their presence interfere with proper muscular action, or when near joints if they limit motion, and for some reason cannot be put back into their normal position, they should be removed. Of the fifty-five cases in this general class, twenty-two belong in this first group. One humeral head was removed in a dislocation of the shoulder associated with fracture of the anatomical neck. In seven cases the outer portion of the lower humeral articular surface was broken off and displaced outward. Three of these were pure capitellar breaks, while the others involved some of the adjacent portion of the bone. In three fractures of the radial head the loose fragments were interfering with motion and were removed. In one Colles' fracture there was

a loose fragment lying among the flexor tendons and interfering with their proper motion. In four cases of fracture of the scaphoid, with dislocation forward of the ulnar fragments with the semi-lunar, the bones could not be reduced and were excised. In one fracture of the scaphoid there was a dorsal dislocation of the ulnar fragment which could not be reduced. In one transverse fracture of the semi-lunar the persistence of pain for two months warranted its removal. In three fractures of the astragalus with complete dislocation of one fragment, the latter was removed and the rest of the bone left in place.

Second.—*Removal of fragments of bone that have become firmly united in improper positions, or of excessive callus.* In two malunited clavicles, the outer end of the inner fragment threatened the skin. Union was firm and there was no functional disability. The deformity did not bother either man, so the projecting fragment was cut away instead of breaking up the union and attempting to re-establish the normal relationship. In one case of separation of the upper humeral epiphysis the deformity partially recurred after an open reduction, and it was not recognized until after union had taken place. The projection of the lower fragment came against the outer margin of the acromion in abduction. This was cut away, restoring the full amount of abduction. In five fractures of the lower extremity of the humerus excessive callus was removed in four, increasing the amount of flexion; and in one supracondyloid with a dorsally displaced lower fragment, the projecting portion of the shaft in front was cut away, making a new fossa for the coronoid. In four Colles' fractures with dorsally displaced lower fragments, the projecting lip of the upper fragment caused marked interference with the movements of the flexor tendons, and it was cut away subperiosteally. This was followed in all cases by marked improvement in the finger motions and grip. In three cases of old Pott's fracture, with imperfect reduction of the astragalus, there was limitation of flexion due to the impinging of the neck of the astragalus against the anterior lip of the tibia. When the latter was cut away the added 10°-15° of flexion gave marked improvement, making outward rotation of the leg unnecessary, and stopping the strain on the inner arch.

Third.—*Removal of a portion of bone which is displaced, but otherwise healthy.* In two cases the radial head was excised because of irreducible anterior dislocation. In two others it was removed because of fracture extensive enough to interfere with pronation and supination. In one of these

cases a second operation had to be performed to remove a fragment of the radial head which had been displaced into the substance of the brachialis anticus, and had proliferated there sufficiently to interfere with flexion. This last operation belongs to the second group. In two cases of old dislocation of the head of the ulna, the latter with the adjacent portion of the shaft, was removed subperiosteally, leaving the styloid process intact. The latter procedure is important to preserve the attachment of the internal lateral ligament of the wrist. In both cases there was a regeneration of bone with complete return of pronation and supination. In four other cases the same procedure was carried out for a derangement of the lower radio-ulnar articulation following a Colles' fracture with impaction, or radial shifting of the lower fragment. In one case a portion of the lower ulnar shaft was excised for the same purpose. The result was not as satisfactory here, as union between the two ends was delayed for eighteen months.

Fourth.—*A cuneiform osteotomy* was performed in two cases. One was on a femur with marked outward bowing, and one on a tibia with inward and forward bowing. The former case failed as the fragments overrode and a later plating operation became necessary. The second was quite successful.

Fifth.—*An arthrectomy* was done in two cases of dislocation of the outer end of the clavicle. The cartilage was removed from both articular surfaces of the joint and a fibrous union was obtained. This seemed preferable to the recurring luxation. In the second instance the main lesion was recognized and repaired, viz., the conoid and trapezoid ligaments had been torn and were sutured.

Sixth.—Two cases of *blood injection for delayed union* are included for the sake of completeness. Both were successful.

Most of the cases enumerated above were late cases which had not received successful treatment at the time of their injury. If all fractures could receive proper, immediate treatment, such operations as have been enumerated would rarely be necessary.

THE LANE PLATE.

I have never put on a Lane plate, but I have had to remove many. Of 54 that were applied by half a dozen of our best surgeons at the Emergency Hospital, 30 had to be removed for non-union, supuration, irritation, breaking or bending of the plate. The other 24 may have trouble later.—W. P. CARR in the *Virginia Medical Semi-Monthly*.

CLASSIFICATION OF FRACTURES.

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In a previous paper¹ it has been shown that the present methods of treating fractures usually give very unsatisfactory results. It therefore becomes necessary to establish authoritative standards by which subsequent fracture work can be measured and compared. Only by knowing the exact nature of the injury can we judge of the excellence of the final end-results. And these results are becoming of increasing importance not only to the surgeon but to the layman, as they effect the amount of compensation received by the workman.

The fact that it is of primary importance to know the exact location of a fracture is almost universally disregarded in the reports of both laymen and physicians, and very seldom has the classification been adopted which is employed and recommended by the British Fracture Committee.² For instance, in studying the very exhaustive report of the Commissioner of Labor for 1909,³ we find that in Great Britain the fracture cases are grouped under the title "Fractures of Limbs and Bones of Trunk." Of these injuries there are 3,682 during the five years covered in this report. This, of course, gives no idea of the number of fractures of the extremities, nor does it aid us in gathering data as to duration and final results of such injuries.

Denmark has a very complete table of accidents by trades, and one on the total loss of a member; but unless the victim of an accident has lost a limb we find no statistics of the location of the injury in the Commissioner's report.

In France, accidents are classified by cause and by industry, but there is no information on the subject of the seat or extent of injury.

Germany has such a complete list for sickness insurance that it leads us to hope for more detailed classification of accidents, but we find nothing but the large division of "arms" and "legs," and the only subdivision is of the right or left arm or leg. Even these fractures are found scattered in with "wounds" and "contusions," as is also the case in the tables of Italy (in 1902-03), where there were 10,382 accidents reported as "wounds, contusions and fractures." This grouping is purely arbitrary and it is absolutely impossible to tell how many of these accidents were fractures, since "wounds and fractures" may be quite exclusive of each other.

In Russia, all injuries are grouped as "wounds

and fractures of the lower extremities" in 8,429 cases out of 43,536 total injuries, or 20%.

Norway speaks only of the "breaking of limbs."

It has been said that the laity and the profession both err in presenting inaccurate and neglectful reports. I should like to present some statistics to bear out this point. To take the layman first: In this class we must consider not only the compensation reports mentioned, but the reports of the great corporations.

Among the best of the compensation reports are the excellent records under the title "Workmen's Insurance in Austria," Vol. I, p. 1, but even where the division of accidents is given in a quite complete and definite summary, the division of accidents is given with only the subdivision, "Fractures of the upper (or lower) leg." Eight hundred and fifty-seven cases are given with only such subdivision, without going into detail as to whether it was the neck of the femur, upper, middle or lower third. This is not detailed enough to be of value in determining a comparison with the British Fracture Committee statistics. The lumping of these statistics will result in a wrong average, and thus an erroneous idea of the duration of disability will be given. This point is brought out in the report of the British Fracture Committee, which shows that of 87 fractures of the neck of the femur, only 23% recovered good function; of 49 fractures of the upper third, 47% recovered good function; of 108 fractures of the middle third, 49% recovered good function; of 54 fractures of the lower third, 55% recovered good function. This will easily show the error of the averaging method.

In our country the report of accidents reported by "Nature of Injury" in bulletin No. 155, issued by the United States Bureau of Labor Statistics, covering compensation for accidents to employees of the United States,⁴ has the classification of injuries designated only by the columns headed "upper" or "lower" extremities, "including fractures." And in the tables which give "Fractures of Lower Extremities," it refers only to "either leg" or "fracture of both legs," neglecting to give the site of injury. It must be noted that this report is supposed to be exceedingly comprehensive, and covers some 25,055 cases of "Injuries of upper and lower extremities," divided as follows: For upper extremities, 5,076 compensated cases, 7,098 non-compensated; for lower extremities, 4,608 compensated, and 8,273 non-compensated cases. But since this table includes loss of an arm or leg, etc., we cannot estimate the proportion of fractures.

Mr. Harris, in "Industrial Accidents and

Loss of Earning Power,"⁵ states that the group of injuries designated as "Wounds, Contusions, Fractures, etc.," forms "nearly 95% of the total number of injuries for which compensation was paid, both in 1907 and 1897. . . . Injuries to the arms and legs formed the most numerous class of accidents, the two comprising 58.43% of all injuries compensated in 1907. . . . Wounds, fractures, etc., of the arms comprised 32.41% of the 1907 injuries as compared with 25.21% in 1897." Again we see the inaccuracy resulting from lumping "Wounds and Fractures," and this also emphasizes, since such a large proportion of injuries are in this class, the necessity of a better classification, that our knowledge may be more exact.

In the "First Annual Report of the Industrial Accident Board" of the Commonwealth of Massachusetts,⁶ we have tables giving in great detail the industry, sex, etc., of the injured persons, the cause of the accidents by industries, etc., but absolutely no information in regard to results, unless the result has been the loss of a limb, in which case it is recorded.

The Minnesota Bureau of Labor⁷ in its 13th Biennial Report for 1911-12 gives statistics of "Breaks and Fractures," and further gives a table of "Fractures—serious, lesser and slight," by industry; but again, this does not indicate their site. And out of the 1,230 cases thus reported, the end-results are given in only 516 cases—less than 50%. In the most recent 14th Biennial Report (1914) of this State, a table is given of the "part of body injured," but this names only the members in a general way, leg, hand, etc. Its fractures are included in the column "Breaks and Fractures," of which there are 2,585 cases reported; but of these, *only 706 or 27% are classified*. It is also perhaps a noteworthy fact (in emphasizing the importance of this subject of fractures) that there are nearly three times as many "breaks and fractures" in 1913-14 as in 1911-12; and over twice as many in 1913-14 as in 1912-13.

Harris, who has before been referred to as nearer accurate than any of the other reporters, back-slides when he comes to his little pamphlet on "The Occupation Hazard of Locomotive Firemen,"⁸ and describes injuries to the extremities as merely "broken."

The greatest care is taken to minimize the risk in the iron and steel industry, but the United States Government report on conditions of employment in the iron and steel industry⁹ specifies the result of accident only in so far as indicating whether the accident befell an arm or a leg. It does not

analyze accidents with the exactness one would expect.

In looking over the reports from various large industrial corporations, manufacturing concerns, railroads, etc., the same lack of classification of accidents is noteworthy. This is the more surprising because the manager of every great business enterprise today is provided with records in elaborate detail. Our railroad engineers, for instance, know the quality, character, and prices of steel rails and the total yearly cost of purchase in this department or any other, because their construction departments are continually keeping records of these things with elaborate detail. But they apparently do not know what they are paying for a fracture among their employees; how much they must allow for treatment of fracture cases in time and money, or even whether that fracture is being treated by the most efficient methods.

One of the largest of the great steel corporations reports 4 fractures of the femur in 3 years; stating that their men were able to work in from 4 to 5 months' time, though only one, they state, did return to work.

Another corporation reports the average as 5 months; still another reports 251 cases of leg fractures in 2 years, without further designating the seat of the fracture. One of the great railroads reports 24 femur fractures. At the end of the year only 13 patients were working, and their average disability was 246 days, i. e., 8 months, as compared with 4 to 5 months in the report of the steel corporation. One asks which records are correct, and if such wide variation does not argue for the crying need of standardization in classifying cases?

We are, however, encouraged to expect better reports from such companies from a notice that at least one of the big railroads has established a most complete card-index system in order that it may learn most accurately the end-results following the injuries to men in its employ.

But we cannot blame the laymen for vagueness or negligence in reports when those of the profession itself are far from unanimous in their methods of classification. A careful perusal of the files of the current technical papers will readily disclose the fact that there is little attention paid to this phase of the subject of fractures. And when it is mentioned at all, the material is often so hidden in a mass of unnecessary and unscientific detail that it is next to impossible to get it out. Even technical articles are most unsatisfactory, on account of the difference of classification. In consulting the records of various hospitals (for fracture data),

which were dictated at various times by different surgeons, a considerable variation of nomenclature was found. Some adhered to the old terms of intra-capsular and extra-capsular, others included both varieties of fractures under the single term of "fracture of neck"; still others used Kocher's classification of fracture subcapitalis and fractura intertrochanterica. The terms of intracapsular are unscientific, inaccurate and misleading because the majority of cases do not fall distinctly into either group since they are "mixed." Intracapsular cases were supposed to include all those in which the lines of fracture were entirely within the capsule; extracapsular, all those which were entirely without the capsule. The majority of fracture lines are oblique or diagonal and not strictly transverse, consequently a fracture may be intracapsular in front and extracapsular behind, inasmuch as the capsule is so placed that it includes more of the joint in front and below than above and behind. Kocher's terms, while more strictly anatomical, have not gained popular usage. Stimson's classification has been followed, i. e., fracture through the neck or subcapital, and fractures at the base of the neck.

Some of the titles of articles in the various magazines lead us to hope to find good statistics, but often when looked up, these articles are found to deal only with the indications for operation, methods, and technic, etc. Even in the most excellent report of the *British Fracture Committee* the duration of disability was *unstated* in 263 out of 638 cases of fractures, or 41%.

In a recent article by Pringle,¹⁰ who has analyzed 230 cases of "open fractures of the long bones, treated by operative methods," the material, although admirably arranged, contains no mention of subdivision. It merely says, "Cases—Femur—21," and again the important question of "where fractured" is neglected.

Foreign surgeons seem to construct very good articles on this subject, to judge from some articles in recent magazines, but one is not sure even with them that any constructive scheme of classification has been agreed upon.¹¹

All surgeons must admit the necessity of collecting data for future guidance in giving the best prognosis and treatment. But it is possible to make this material of value *only* by carefully classifying and correctly collecting large numbers of cases, so that we can find the normal average duration of disability, which is our best guide for treatment in a given type of case. In our previous attempts to do this we have become more and more dissatis-

fied with present statistics, for our judgment tells us that the majority of statistics are incorrect. An example of the failure to secure satisfactory data is shown in the attempt of Estes,¹² reported in the *Annals of Surgery* for July, 1912, to collect sufficient statistics for the Pennsylvania State Medical Society to establish definitely reliable standards of efficiency. After much labor he decided that the cases collected were unavailable for such use, owing to the indefinite nature of many of the reports. In a total of 760 reported cases, the seat of fracture is not stated in 482 cases; the amount of shortening was not stated in 200 cases; the age of the patient was not given in 394 cases; the question of anesthesia was not stated in 409 cases; and the method of treatment was not stated in 360 cases; the length of time in bed was not stated in 466 cases; the duration of disability was not stated in 576 cases; while the reports of the use of the x-ray were that it was used in 130 cases only and showed good apposition without angulation in *only* 83 cases.

It has been shown that it is most necessary for primary records to be classified by a universal system in order to be of any value; and therefore the form of inquiry used by the British Fracture Committee is here suggested as the most satisfactory form.

It is earnestly hoped that the above statistics will

serve to awaken a realization of the present situation, which will result in a reform of the system of classifying and reporting injuries as indicated, so that we shall ultimately be able to find useful data on which to base recommendations for the most satisfactory treatment of fractures.

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INQUIRY FORM FOR FRACTURES

- Femur:
- (a.) Fracture of neck.
 - (b.) " " upper third of shaft.
 - (c.) " " middle of shaft.
 - (d.) " " lower third of shaft.
 - (e.) " " lower extremity involving knee joint.
- Tibia:
- (a.) Fracture of shaft.
 - (b.) Internal malleolus.
- Fibula:
- (a.) Fracture of shaft.
 - (b.) Separated lower epiphysis (with or without fracture).
- Tibia and Fibula:
- (a.) Fracture of shafts of both bones.
 - (b.) Pott's fracture.
- Humerus:
- (a.) Anatomical neck.
 - (b.) Fracture of tuberosity.
 - (c.) " " surgical neck.
- (d.) " " shaft.
- (e.) Supra of condylic fracture.
- (f.) Separated lower epiphysis (with or without fracture).
- (g.) Internal condyle; external condyle, capitellum.
- Radius:
- (a.) Fracture of shaft.
 - (b.) Separated lower epiphysis (with or without fracture).
- Ulna:
- (a.) Fracture of olecranon.
 - (b.) " " shaft.
 - (c.) Separated lower epiphysis (with or without fracture).
- Radius and Ulna:
- (a.) Fracture of shafts of both bones.
 - (b.) Colles' fracture.
- Age Groups:
- 0-10; 11-15; 16-20; 21-25; 26-45; 45-60; 61 years and over.

AMERICAN SURGICAL ASSOCIATION

General Results: Good Moderate Bad

Anatomical

Functional

1. Bone.....2. Site. Neck.....Upper.....Middle.....Lower 3d.....Condyle.....
3. Name.....4. Sex.....5. Age.....6. Occupation.....
7. Case of Dr.....8. Hosp. where treated.....9. Date of entering Hosp.....
10. Cause of fracture.....direct violence.....indirect violence.....
11. Kind of fracture.....oblique.....spiral.....transverse.....simple.....compound.....comminuted.....
12. Reduction.....How many hours elapsed after accident before reduction?.....
13. Anaesthetic used.....yes.....no.....
14. Fixation—Closed Method:

Open Method:

How long after injury was operation performed?.....

Was open reduction alone performed?.....

What form of internal fixation was used?.....

Steel plates.....

Bone grafts.....

Splints

Plaster of Paris

Traction: Bucks.....Bardenheuer

- | | | | |
|-------------------|-----------|--|-----------------|
| Jones | Steinmann | Wire | Nails |
| Hodgen | Vertical | Was it later necessary to remove fixation materials? | |
| Amt. weight used? | | | |
15. *Shortening* At first dressing? When all apparatus was removed?
 - When discharged from Hosp? At latest observation?
 16. *X-ray* first finding on the day? At latest observation?
 17. How long was patient confined in bed? How long in Hospital?
 18. How long did patient use crutches or canes?
 19. *Results* final examination made weeks months after injury
 20. *Disability* partial complete estimated by:

swelling of soft parts	pain	deformity	shortening	angulation
interference with joint function	endurance			
 21. *Mortality* age of patient cause of death
 - Location and kind of fracture
 22. *Duration of absence from work* weeks months
 23. Is patient fully able to take his former job?
 24. Present wage earning capacity compared with former?

TREATMENT OF FRACTURES.

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The majority of those who were in the medical school clinics ten or fifteen years ago probably remember that the general surgeon who successfully reduced a fracture received scant consideration, whereas the abdominal surgeon "crowned himself with glory" by removing healthy ovaries to cure hysteria! The writer recalls an eminent surgeon who had devoted especial attention to the treatment of fractures and other bone lesions, and at the same time had achieved brilliant results in abdominal and general surgery. Certain of his competitors applied the undesirable epithet to him of "bone surgeon" with the view (as he thought) of detracting from the value of his work in other directions. He remarked at the time, "They will live to see the day when they will be glad to have the title 'bone surgeons'!" His prediction has come true, for the treatment of bone lesions is today the most difficult of all surgery, requiring a technical finesse scarcely known to the abdominal surgeon of twenty years ago, and possessed by comparatively few of the present.

The two recently developed greatest factors that have contributed to the more successful management of fractures are the x-ray and open operation. Whatever may be the final decision of surgeons as to the advisability of the open method, the fact remains that it has undoubtedly stimulated more careful study of fractures, resulting in decided improvement in treatment by the closed method. That where possible the x-ray should be employed in every case of fracture, or suspected fracture, cannot be gainsaid. That excellent results may be obtained without its use is not a valid argument against it, as it affords information as to adjustment of fragments which is obtainable by no other means.

The primary object in the treatment of fractures is to secure a good functional result. The majority of these injuries occurs in people who earn their livelihood by manual labor, and in proportion to their disability is the curtailment of their usefulness, as seldom are such individuals fitted for any other vocation. Where perfect anatomical alignment can be secured, the best results may be expected; but it is unwise to risk the functional integrity of a limb for the sake of anatomical reduction.

Jones considers every fracture a potential deformity, and the first consideration in the treatment is to maintain a true anatomical alignment of the shaft in the case of long bones. "A joint which is tender to palpation is not ready for movement" (Thomas). Experience shows that, excepting in actual conditions of disease, nearly all cases of "non-union" are cases of "delayed union." Physiological use is the best agent to assist in making union solid, but it is wise to protect a fracture with artificial support even after it appears to be firmly united.

While Lane may successfully plate all his simple fractures, and Murphy may secure union in ununited fractures by bone transplants, such radical procedures will always represent a small portion of the fracture work required of physicians and surgeons.

What are the principal factors to be considered in the treatment of a given fracture? First, is the general condition of the patient: the method of treatment must be adapted to the patient and the fracture, and not the patient and the fracture to the method of treatment. Careful physical examination is therefore a prerequisite to the production of best results in the treatment. The management of a fracture in an individual of extreme age would necessarily be different from that in a young healthy adult. Organic disease, particularly cardiac and renal, would militate against prolonged confinement to bed. The temperament of the individual must also be considered, the highly nervous not submit-

ting to enforced confinement with such readiness and ease as does one of phlegmatic temperament. The presence or absence of syphilis and other diseases must be ascertained, also the personal habits of the individual, particularly as to indulgence in alcohol.

Second, the surroundings and environment: patients do not select the time and place to sustain a fracture! For example, in railroad surgery, they are found in the yards, shops, on the road, etc., where surroundings are not such as would be selected had the surgeon his choice as to the time and place for treatment. Under such circumstances it is always best to immediately apply a temporary dressing, the patient being then removed to a place where permanent dressings can be properly applied. Reduction and fixation apparatus should never be employed until the patient has been placed in the most favorable surroundings.

Third, the fracture itself and what will be productive of the best result in that particular fracture: this will be determined by the nature and location of the fracture, whether simple or compound, and whether in the shaft of one of the long bones, or near a joint.

Study of individual fractures naturally leads one to the consideration of the open and closed methods of treatment. In the majority of cases the closed method will secure good functional results, and for the average surgeon and practitioner is by far the safest procedure. There are certain fractures, however, in which better results can be secured by the open method of treatment; but in such cases it is necessary that the patient be under the care of a competent surgeon in a thoroughly equipped hospital with trained assistants. The one fact above all others which has contributed to disastrous results following the open method of treatment is that surgeons have not strictly adhered to these requirements.

The operative technic in the open method is most difficult, and the acme of asepsis should be the watchword. To attempt short-cuts by ignoring the technic so laboriously perfected by the pioneer laborers in this field invites disaster, and here as elsewhere he who does things by halves will secure faulty results. I have seen plates applied to bones and the patient returned to bed without the application of a cast, splint, or other means of protection. Quite recently I amputated a leg because of infection resulting from the plating of a compound fracture which had not perfectly healed, and the open method was condemned by the surgeon who undertook the original work. Not long ago while doing

a transplantation a surgeon of reputation who was present remarked that refusal to permit anything that had touched the gloved hand to enter the wound was an acknowledgment of failure in proper sterilization and handling of the gloves, entirely overlooking the facts that gloves are more likely to be contaminated during the operation than instruments, that a glove admitted to the wound is likely to be punctured, that even a small unrecognized puncture constitutes a condition which would destroy the chance of success. The open method unquestionably has its place, and while numerically considered the fractures treated by the open will be far less than by the closed method, there are rather clear and distinct indications for employment of the former procedure.

Briefly stated, the indications for the open treatment are as follows: (1) In fractures of the shaft of long bones where reduction cannot be secured by the closed method, or if secured cannot be maintained; (2) where there is interposition of the soft parts; (3) in spiral fractures of the humerus and femur; (4) in cases of multiple fracture; (5) in fracture with marked rotation of the fragment; (6) fracture of both bones of the leg or the forearm—in these fractures unsatisfactory results are oftentimes secured by the closed treatment, and the open method is to be advocated with plating of either one or both bones; (7) fractures in or near joints where the fragments or joint surfaces cannot be brought into proper position to secure anatomical alignment and physiological results. Malposition or detachment of fragments in the region of joints usually indicates an excessive amount of callus, and the method which will secure the best apposition of the fragments should be adopted. In many cases this can be better secured by the open than the closed treatment.

Let it be again emphasized that the general condition of the patient must be carefully studied before attempting such radical methods of treatment. The aged and the very young manifestly do not make good subjects for the open treatment.

As to the time for operation: in this particular there seems to be a wide divergence of opinion. Some surgeons advocate immediate operation; whereas others advise delay until a week or ten days have elapsed following the injury. Inasmuch as good results have been secured by the advocates of both immediate and delayed operation, and since it is unproven that the results of one plan are superior to the other, it must be concluded that any time within the first ten days is suitable for operative procedures.

In fractures of the leg, Dujarier believes that between the fifth and tenth day following the injury is the most favorable time for operation. Asepsis is vigorously exacted, and neither gloved finger nor any instrument which has touched the gloved hand is allowed to enter the wound. To maintain the fragments in position he advocates a double pronged hook or red copper wire 2 mm. in diameter. In some instances both may be necessary. The following indications for the open treatment are noted: (1) In transverse fractures, before or after reduction, where the fragments are not partially in contact; (2) in oblique fractures operation is indicated in nearly every case, the exceptions being those with very little displacement and with overriding of less than one centimeter; (3) the choice between hooks and wires is made according to the nature of the fracture as shown by antero-posterior and lateral radiographs; hooks are used in transverse and slightly oblique fractures. The only contraindications are the general condition of the patient, or such local condition of the skin as render an aseptic operation impossible.

Fredet follows the technic of Lambotte, but restricts the indications for open treatment to those cases that are incapable of healing by the conservative methods, and concludes: (1) That operation should not be undertaken without perfect equipment; (2) that it should be restricted to grave fractures, which cannot heal by bloodless methods; to those in which there is a chance that they will not heal by bloodless methods; and those which apparently will be greatly delayed in union; (3) that the operation is too difficult to be undertaken by any but experienced surgeons. The primary considerations in the operation as devised by Lambotte are: The perfect reduction of the fracture, and the solid and lasting maintenance of that reduction; large incisions and rigid asepsis, the gloved hand never being permitted to enter the wound. In maintaining the fragment in position he suggests: (1) In oblique fractures a circle of bronze-aluminum wire; (2) screws may be advantageously used where fragments are to be fixed to shaft, or in T-fractures, but cannot be expected to be permanent when head rests subcutaneously; (3) plates.

It has been shown that from the first to the fourth day following fracture is the period of infiltration, when there is a great deal of extravasation of blood; by the tenth day connective tissue and callus have commenced to form; the extravasation of blood has then been largely absorbed, and there is probably less trauma to the tissues in operating at that time.

Hitzrot has recently reviewed the theory of bone

regeneration advanced by Dupuytren and Wieder, and based upon his experience concludes: (1) First to fourth day, period of infiltration; (2) fourth to twelfth day period, gradual absorption of the exudate from the soft parts and its replacement by connective tissues; the endosteum undergoes formation of osteoid trabeculae at a distance from the line of fracture; (3) twelfth to eighty-fifth day, stage of reorganization: augmentation of callus where it is most needed, and absorption where it is not required; (4) permanent callus formation, eighty-fifth to two hundred and eightieth day; absorption of callus with re-deposition of dense bone in the dilated spaces, and the appearance of distinct lamellae in the new bone. He states that while Wieder did not continue his work to the fifth stage as did Dupuytren, in fractures which had perfectly united there is until the third month nothing but cartilage or connective tissue across the line of fracture. Cartilage was always found on the concave side of the fracture with its apex at the line of fracture and its base on the periosteum. The most important factor in the stage of exudation is the formation of fibrin.

While it may be the consensus of opinion that the open treatment somewhat delays union, this is not a valid argument against the method when used in fractures where better results can be secured than by the closed treatment. The objection that the open treatment contributes to non-union is probably an admission of faulty technic, and it is not alone the presence of the foreign body which prevents union, but some low type of infection existing at the time of operation. The fact that some plates have to be removed after union is apparent is insufficient to condemn the method. The plate has performed its function if it has held the fragments in perfect anatomical alignment, and its removal—while in many cases can be accomplished under local anesthesia or general anesthesia may be administered if necessary—requires but a short time and is attended by little danger to the patient, leaving a wound which speedily heals.

In this connection, however, Roberts cautions against the too enthusiastic adoption of the open method, with the application of plates, etc., as a routine means of dealing with fractures. The profession and the public should know that while the method is a necessity in some cases, and its adoption a question of judgment in others, there are many instances of subcutaneous fracture in which it is contraindicated. Good results can oftentimes be obtained, both as to anatomic restoration of the parts, good function and rapid cures, by external

dressings guided by a thoughtful, careful surgeon who has a mechanical mind and anatomical knowledge. The operative treatment is particularly dangerous when adopted by novices in aseptic surgery, or in places where complete aseptic surroundings cannot be obtained.

Fracture of the bones of the arm. In fractures of the tuberosities or neck of the humerus, better results are obtained by the open treatment, nailing the fragments in proper position. The fragments are of such nature and so situated that it is difficult and oftentimes impossible to secure proper anatomical alignment by the closed method. If, however, the closed method must be employed, the arm should be dressed in abduction and external rotation.

Believing that anatomic data are oftentimes overlooked, Cohn reviews the insertion of muscles attached to the tuberosities, and based upon information thus obtained advocates abduction and external rotation of the arm to favor apposition of the fragments, and to overcome the action of the subscapularis which has a tendency to lacerate the capsule and thereby favors dislocation. Further external rotation favors apposition of the shaft with the tuberosity, and abduction also relieves the pressure upon the tuberosity by relaxing the deltoid.

In transverse fractures of the shaft good results can be secured by the closed treatment, dressing the arm in such position, and maintaining it by splints and extension, as will meet the requirements of the individual fracture.

In oblique and spiral fractures of the humerus, the best results can be secured by encircling the fragments with wire, and thus retaining them in that position.

In any fracture of the humerus where the skiagram shows that the integrity of the musculo-spiral nerve may be jeopardized by the fragment or subsequent callus formation, the open treatment is indicated at the time of the fracture.

In fractures at the elbow, involving the condyles, the arm should be dressed in acute flexion if treated by the closed method. The better plan is the open treatment, nailing the condyles to the shaft, thus securing proper anatomical alignment of fragments and joint surfaces. This treatment reduces callus formation to the minimum, and is par excellence the method to be employed in fractures in or near the joints.

Murphy suggests that after dressing in full flexion fractures of the condyles should not be disturbed for passive motion in less than two and a half weeks for children, and three weeks for adults.

Passive motion too early causes pain, produces laceration, and results in extensive cicatricial formation with consequent ankylosis or limitation of motion. The best method of securing good position after condylar fracture is by the open operation and nailing on the fourth or fifth day. This prevents friction which produces callus. The less the amount of callus, the less the likelihood of ankylosis. After nailing the fragments, the arm may be placed in a sling with no other dressing. In fracture of the olecranon, nailing at proper angle is better than plating or wiring. In old fractures, various operations have been suggested to approximate normal anatomical position. In fracture of the humerus near its head, fragments should be adjusted by operation and nailed. Impacted fractures of the upper tibia are usually diagnosed sprain and overlooked. Fractures near hip joint usually require nailing. Fractures of the neck, twenty-five to thirty pounds extension, with superlative abduction of both legs.

Skinner concludes that (1) in ankle fractures the functional result depends upon the proper reduction of the astragalus, so that the line of weight-bearing force which passes through center of tibia also passes through the astragalus at its center. This line is shown on the antero-posterior roentgenogram of the ankle; (2) in wrist fractures the entire styloid process of the lower end of radius is constantly distal to a line which touches the tip of the ulnar styloid, which line is at a right angle to the longitudinal axis of the radius. The functional result depends upon the reduction of the radial styloid to this position, which is shown on postero-anterior roentgenogram of the wrist.

In fractures of the olecranon process, the short fragments should be nailed to the long fragment, and the arm then dressed in extension. In fractures of one bone of the forearm, in nearly all instances, the closed method should be employed. The other bone acting as a splint, it is not difficult to secure a fair alignment of the fragments with good functional results. In fracture of both bones of the forearm, it is difficult to secure and maintain good apposition of the fragments by the closed method of treatment, and the open operation with plating or wiring of one or both bones is to be preferred. The excessive amount of callus formation sometimes markedly interferes with rotation of the arm, especially under the older methods of treatment. In nearly all cases of Colles' fracture, which is the most frequent fracture of the region of the wrist joint, the closed method will be successful.

In the lower extremity, fractures of the neck of

the femur involving the trochanters can usually be successfully treated with the leg in abduction, retaining it in position by either a plaster cast encircling the leg and trunk to the costal region, or abduction of both legs retained by the Rainey splint. In fractures of the neck of the bone, in addition to these measures a weight and extension of twenty-five to thirty pounds as suggested by Murphy is of service. These fractures may also be successfully treated by the open method, the trochanters or neck being nailed in proper position. In treating fractures of the hip, Moore advocates the so-called anatomical method of Maxwell. He states it has been demonstrated by Maxwell, Ruth, Whitman, and others that fractures of the neck of the femur can be treated about as successfully as those of the shaft, and that the practically hopeless prognosis as to function given in most text books is based upon the results of the older methods of treatment. The reason for failure of the older methods lies in the fact that the fragments are not brought into apposition. Maxwell's method in brief consists in adding a "side pull" to Buck's extension, the result of the "two pulls" being a "pull outward" in the long axis of the neck of the femur, thereby rendering the capsule tense and bringing the fragments into proper relation.

In fractures of the shaft of the femur, shortening and consequent deformity may be expected when treated by the closed method. The muscles are so strong that it requires a great deal of force to overcome the displacement and secure proper reduction. By operative treatment good apposition of the fragments can be secured, and by careful manipulation of the limb after application of the plate this apposition can be maintained. The extension methods by use of the caliper splint, or by a nail driven through the lower end of the femur with extension applied from this point, are said to be more effective than the time-honored Buck's extension apparatus, but the writer has had no experience with these measures, and desires to candidly state that they do not appeal to him.

In fractures of the condyles at the lower end of the femur, where extension cannot be applied, and where malposition of the fragments is likely to result in stiffness or limitation of movement of the knee joint, the open method of treatment and nailing the fragments in proper position is the method of choice.

The same general rules apply to fracture of the leg as to the forearm, viz., if one bone only be broken the other acts as a splint, and such cases can be successfully treated by the closed method. If

both bones are broken, proper anatomical alignment is difficult to secure, and the open operation with plating of the tibia will give the best results. In fractures of the lower end of the tibia and fibula, which are of great importance because of their frequency and the deformity which so often follows, x-ray examination is almost indispensable. The classical Pott's fracture is rare when compared with the number of fractures which occur in this locality. These fractures are usually accompanied by more or less displacement of the astragalus, the result of widening of the mortise, either by rupture of the interosseous ligament or fractures of one or both of the malleoli. In order to secure a good weight-bearing leg, proper reduction is necessary, and without skiagrams it is difficult to determine the degree and direction of the dislocation of the astragalus, and what measures may best be employed to accomplish reduction. Colvin concludes that (1) the lesions occurring at the lower end of the tibia and fibula are very varied in character, usually requiring the radiograph for differentiation, and as a guide to treatment; (2) Pott's fracture (as he describes it) is very rare; (3) the most frequent lesion is a bimalleolar fracture, and the commonest deformity is that of the everted foot; (4) the various lesions are produced by a predominating everting or inverting force; (5) these forces used as corrective measures in either direction may result in the production of a deformity, the opposite to the one caused by the original injury; (6) adduction or inversion of the foot is not necessary as a retention dressing, excepting in Pott's fracture, and if used in bimalleolar fractures is very liable to result in deformity; (7) the original inverting or everting force which fractured one or both malleoli may have spent itself before displacement of the malleoli has occurred, and any subsequent force applied in either direction will cause an eversion or inversion deformity.

In typical Pott's fracture the foot dressed in adduction with a long internal splint, is usually all that is required. In fracture of both malleoli, this is not a suitable dressing, and the better plan is to nail the fragments in position, dressing the foot in line with the long axis and at right angles to the leg. Lipping fractures, as mentioned by Speed, are rather common in this situation and can only be recognized by the x-ray. Unrecognized and untreated they lead to serious subsequent disability.

Speed emphasizes the importance of correct axis of weight-bearing force and relation of joint surfaces, i.e., from the anterior superior iliac spine through patella and middle of astragalus. If joint

surface of tibia and astragalus bear correct relation to each other, prognosis for a useful weight-bearing function of foot and ankle is excellent. It is said that one may disregard position of fragments in the diagnosis. Powerful weight-bearing function can only be accomplished by replacing the malleoli in proper position. Of great importance are lipping fractures with anterior or posterior displacement of the astragalus. If lower end of fibula alone has been split or twisted, hold astragalus well against the internal malleolus and then hope to drag the cracked or broken external malleolus over to its position by forced inversion, depending upon such fibres of the external lateral ligaments as are still intact. Where both malleoli are broken, treatment is more difficult. Simple inversion is not sufficient. There is usually displacements of the astragalus which must be returned to the proper position and fragments so adjusted that the normal mortise will be retained. In some cases manipulation and plaster cast will be sufficient, in others nailing may be required. Where bimalleolar fracture is complicated by rupture of the interosseous ligament with separation of lower ends of bones and possible forcing upward of astragalus, the open operation is advised nailing the malleoli and also fastening the tibia and fibula together. After the open operation the foot should rest at right angle and not in adduction. After dressing is removed, practice gentle massage, but not sufficient to cause pain; weights may be cautiously applied. If painful, this is ample evidence that callus is not yet matured. If external malleolus the greatest sufferer at the beginning of weight application, the foot should be turned slightly inward to prevent yielding of callus. "Lipping fractures" should be carefully looked for, *i.e.*, where a wedge of bone is "knocked off" the tibia. Displacement of fragment and excessive callus commonly observed. If foot is fixed in extreme dorsiflexion for a few days, the deformity will not return. However, the open operation may become necessary in some cases. "Among the laboring class nothing so interferes with wage earning as weakened leg support and the whole train of life that follows the ability to get about on two good feet is very different from that which follows the permanent and partial disability of a bad ankle." These fractures occasionally have some permanency treated by the very best methods devised, and each man so afflicted should be given the very best treatment, and should not be allowed to use the ankle until callus is hard enough and ligaments sufficiently strong to bear his weight. This may be anywhere from three to twelve months. Speed closes his

paper with the following summary: (1) Ankle fractures are relatively numerous and have much influence on the wage-earning power of laboring people; (2) Pott's fracture as classically understood is very rare; (3) each ankle fracture should be treated in accordance with the most searching diagnosis, aided if possible by skiagrams, and not by routine methods; (4) both antero-posterior and lateral skiagrams should be most carefully studied; (5) more emphasis should be laid on the treatment of fracture of the external malleolus with or without ligamentous damage on the inner side of the ankle by over-correction in extreme inversion on a splint or in a cast; (6) special attention should be paid to cases with posterior or anterior displacement of the foot, as these indicate lipping fractures of the tibia or complete separation of the external malleolus with loss of either anterior or posterior tibio-fibular ligaments; operation should be considered in these cases; (7) operative measures—simple replacement, nailing, or other procedures—give perfect anatomical results in selected cases; (8) use of the foot should not be permitted until pain is not caused.

Magruder concludes an instructive article on the treatment of fractures as follows: (1) The ideal treatment is the closed method where reduction can be maintained; (2) open method without introduction of foreign body when reduction can be maintained; (3) open method with use of least possible amount of foreign material. Indications for operation: (1) Where complete reduction is impossible otherwise; (2) interposition of soft parts; (3) spiral fracture with separation; (4) where apposition cannot be maintained; (5) multiple fractures; (6) rotation of fragments; (7) injury to blood-vessels; (8) marked deformity. Advantages of open treatment: (1) Better union; (2) relief from pressure upon nerves; (3) anatomical reduction; (4) removal of interposed soft parts; (5) less danger of ankylosis in joint fractures. Treatment of compound fractures: (1) Extensive comminution of bone and inoperable damage to blood-vessels and nerves, immediate amputation is advised; (2) where amputation is not indicated, treat as closed fracture.

The importance of physiological use and passive motion at the proper time in the treatment of fractures cannot be overestimated, and gentle massage is also entitled to greater importance than has hitherto been accorded the practice. The period in the treatment of fractures when movement and massage may be most advantageously applied must necessarily vary in different cases for obvious reasons.

It is a trite saying that a joint that is tender to palpation is not ready for movement, and that pas-

sive motion should be practiced with caution for fear of stimulating callus formation. Perhaps the best agent to assist in making union solid is physiological use, but the fracture should be protected by artificial support even after it appears that the fragments have firmly united.

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HIP FRACTURES.

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A half dozen years ago I was seized with an idea concerning hip fractures. I knew even less about hips then than I do now, but experience and investigation since then have convinced me that the idea is sound for the class of cases to which it is applicable.

The idea, as then formulated, is delightfully simple. *If unimpacted hip fractures do badly, while impacted hip fractures unite well, then why not impact the loose fractures artificially?* Why not? I have found no reason why not, and have found reason to believe the procedure one of real value, not only in the hope it gives in the handling of non-impacted cases, but also in the freedom it gives us in handling cases impacted, but with serious deformity, that we have in the past been afraid (and rightly afraid) to correct, for fear of prejudicing union. Of this pet method of mine, you are doomed to hear more presently, but first must come a broad review of the situation.

When I came to look up the current knowledge of hip fracture, I found a curious chaos. Many worthy gentlemen cured *all* their cases, but curiously enough, by wholly diverse methods, and anything like precise data seemed hard to come at. Presently I found out why, and in my own attempt to track down old cases, I grew tolerant of other people's failures.

These cases are mainly in the aged—the dependent aged who go from son to daughter, to cousin, and only too often to the county farm, or its equivalent, and cannot be really studied.

I have no data that suit me, and find others sim-

ilarly fixed: let me only ask the reader if *he* knows the present state of the three cases *he* treated for fractured hip last winter? The whole trouble with our knowledge of these cases is that we have not had the facts, and we have allowed ourselves to generalize from our impressions. Our lack of precise knowledge comes down to three items:

1. We have not classified our cases.
2. We have not studied untreated cases, or cases under "routine" treatment.
3. Our knowledge of end-results is imperfect *in toto*, and the results have not been studied in accurate relation, either to the primary lesion or to the treatment followed.

In this paper I have only a few points to make; many details are to be omitted, ruthlessly.

As to Item 1: Three generations ago, Astley Cooper gave us the classification; we had just simply forgotten it.

Hip fractures are either extracapsular or intracapsular. If intracapsular, they are either impacted or they are not.

That's all.

The extracapsular fractures show no tendency to failure of union; they are like any other fracture—subject to deformity if not well handled. Yet they have been lumped with the others, and have been responsible for the vogue of apparently successful methods of treatment, as we shall see.

As to Item 2, we have not studied routine cases. Not only do we get union regularly and uniformly in the extracapsular breaks, crippled though they may be from deformity, contractures, and secondary arthritis, but even in the intracapsular cases we have led ourselves astray. It is *not* true that all impacted fractures get bony union. Not rarely, the trifling degree of impaction present breaks up in bed—in splints—owing to the force of gravity, acting with the loosening tendency of that primary rarefaction that attends all bone repair. Nor is it true that ability to walk proves bony union. Good function may be present without a trace of bony union.

Item 3: End-results have not been studied as to their relation to original lesions; that has been said already. They have not been studied in relation to special methods of treatment. Especially they have not been studied as to the results of different methods, in different classes of lesions. These fractures are treated in but five ways (for I shall not go into the operative treatment, interesting as it is, at this time):

1. Expectant treatment, or treatment with sand-bags, with the long side splint, etc., is merely a

form of rest. In the cases of both types, it gives the result of original forces, and lesions uninfluenced for good or bad by the surgeon—sometimes they are good. In impacted fractures of the neck proper, well impacted without great eversion, in old people, this is the treatment. If impaction is absent, or gives way in the first few weeks, this treatment gives wretched results. In the extracapsular cases, rarely firmly impacted, it does not insure against muscle-pull and progressive deformity, and is not a desirable method.

2. Direct traction. Some years ago, with J. B. Blake, I had a chance to watch results of this treatment systematically applied on all cases in a four months' service. I think Blake will agree with me that in fractures of the neck proper, the results, so far as traced, were distinctly poor. We did not try it on the extracapsular cases. Here it should be somewhat better than the simple expectant plan.

3. Longitudinal, combined with lateral traction. This is the Phillips-Maxwell-Ruth method—the "anatomic" method, largely used to the west of us. I am not clever enough to see why it is even "anatomic" to pull apart fracture-surfaces, in ill-vascularized bone, for that is what the method must do, if it works at all. There are many blanket recommendations of this method, but no serious critique of results that I have seen. There is a triumphant series of dry specimens of end-results, obtained post-mortem in cases long healed. I have seen these specimens; there were seven in all. Of these, six were indubitably extracapsular fractures, and in the seventh, arthritic and periarthritic changes made diagnosis difficult, but the original lesion *seemed* to have been extraarticular. Not a specimen, nor a plate, nor an end-result report have I seen to show the value or the sanity of this method in relation to the intracapsular neck-fractures that represent the only cases of real difficulty. From what we have lately learned as to bone repair, the chance of repair in bone of low vitality and poor circulation, like that of grafts and intra-articular fragments, depends entirely on close coaptation and fixation; exactly what this method works against. I am very ready to accept this method as adequate—perhaps the best scheme, in *extra-articular* fractures—but if we so use it, let us not forget *what* cases we are getting our show results in.

4. Whitman's method. Like all his work, it is clever and logical. Undoubtedly the method is good, and as we shall presently see, I use it freely, but it is open to several objections.

In the first place (not really an important mat-

ter), many men are inclined to doubt the locking of the upper fragment at the limit of abduction, believing rather that tension on the abductor muscles gives the limit of abduction.

Secondly, there is real danger that in less expert hands than Whitman's, the fragments may be forced by one another, not jammed together. This I shall illustrate later.

Thirdly, plaster spicas in stout patients do not hold abduction firmly.

Fourthly, and most important, Whitman seems to have made no discrimination as to the lesion present, in cases treated or cases reported. All fractures of the hip look alike to him, seemingly.

Until we have some real x-ray demonstration of the results, and of the percentage of good results obtained by this method, in *unimpacted intracapsular* fractures, it will continue to be obvious that this treatment rests on argument rather than on tests. One thing is certain, however; the position of abduction is worth while, when we can use it. One of the graver factors in disability from hip fracture, is the common contracture of the muscles in abduction. This is definitely prevented by the maintenance of abduction during repair, and Whitman deserves full credit for introducing practical abduction, whether we agree with him wholly or only in part.

So far as the extracapsular cases go—those that unite anyhow, but tend to be twisted—I do not know whether Ruth's scheme or Whitman's or my own is best.

5. My method. Artificial impaction with the mallet. Frankly a method open to the same objection as Whitman's; not sufficiently proved as yet by the sheer test of results, but at least logical and definitely useful so far as we have gone. What I have done is to anesthetize lightly, then pull the loose fracture into position; then, padding the trochanter heavily with felt, drive the trochanter in with careful, slow blows, with a heavy wooden mallet. As this is done, one feels that the bone impacts and the free outward rolling motion disappears promptly. Just how much force is needed it is hard to define. It is not great, and the large mallet used is chosen, not to hit a hard blow, but to get sufficient impact from a *slow, controlled swing*. In the dozen and a half or two dozen cases, in which I have used this method, no harm has been done. In only one case did even any ecchymosis appear over the trochanter, where the blow was delivered. In the cases originally impacted, but with serious deformity, I have not hesitated to remodel them,

and then to re-impact. In so doing, one need use but little force, either in manipulating or in impacting. Contrary to the usual idea, these impactions are not very solid, and what one does is to remodel and then consolidate the impaction, so to speak; it is never broken up bodily. I have also impacted a number of cases of extracapsular fractures with uniformly good results. Most of these fractures are loose, and we can pull them down and then impact them. In this class, the same thing practically can be accomplished by continued traction. In the neck fractures, however, unimpacted or loosened, nothing can take the place of this method; in no other way can we give, in these almost hopeless cases, the practical security of a firm impaction.

No one method is going to give results in all hip fractures. The selection of cases should be on about the following plan:

In a percentage of very old or infirm people, we can do nothing but wait the event, and take chances on the hip. In many cases of true neck fracture, the position is tolerable; the impaction seems solid; active interference is unnecessary; abduction during treatment is advisable to avoid adduction contractures; it can be secured by sand bags or in a plaster spica, according to the patient. If impaction seems not very firm, then sharp abduction in a spica plaster is wise. If there is no impaction, or if the position needs remodeling, and the patient can take ether, then we should use the mallet.

BONE TRANSPLANTATION IN POTT'S DISEASE.

Surgical measures for tuberculous spine disease are a great advance over conservative treatment, but should be restricted to selected cases. Undoubtedly they shorten the period of disability.

Not only may existing deformity be prevented from becoming exaggerated, but also deformity itself may be prevented by surgical measures.

Too early reliance cannot be placed on the strength of the bone graft. It takes time for the splint to become securely fixed by permanent callus.

External support must not be disregarded for many months following the operation; otherwise deformity may ultimately occur.

Even with post-operative protective treatment for a period of six or more months, the duration of treatment is much shorter than the average duration under non-operative methods.

Success of bone transplantation for the cure of tuberculous spine disease depends on the proper implantation of the bone splint into the diseased and normal contiguous vertebrae. Essential to the success is the *careful protective after-treatment* for a period of months.—CHARLES M. JACOBS in *The J. A. M. A.*

FRACTURES OF THE LOWER EXTREMITY AND THEIR TREATMENT.

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The awakening of our profession to the defects in our method of treating fractures of the lower extremity could be portrayed in no more forceful argument than that presented by Dr. J. B. Walker in the December, 1914, number of the AMERICAN JOURNAL OF SURGERY. The facts and figures brought out in his article coincide with my experience and observation for a number of years past.

Early in 1894 I recognized that our methods were very imperfect; that anything like a universally good result was the exception rather than the rule with even our best men; and that the results with the less careful were simply appalling. At this time I began a careful study of my fracture cases to see where these defects were.

First was the uncertainty of the methods we were taught. We were impressed, from both the lecture-room and the text-books, to bring the fractured ends of the bone in apposition and hold them there, but the methods described for this purpose were incapable of doing so. Human strength is absolutely incapable of a pull strong and long enough to overcome the action of the powerful muscles of the thigh under the painful irritation of fractured bones for a sufficient length of time to apply a permanent dressing.

Then, the dressings we were advised to use were mechanically faulty and incapable of holding the bone ends in apposition; consequently, with defective reduction in the first place, and imperfect retention in the second, bad results were all we could expect; hence, the old idea that one to one and one-half inches of shortening was justifiable.

I believe every physician who has pulled on a fractured femur to reduce it and hold it reduced for twenty to thirty minutes will agree with me, that his strength was inadequate and too unsteady for that purpose. Therefore, some mechanical device that will pull slow and steadily to insure perfect reduction with minimum amount of pain, and hold as long as may be necessary in a fixed position to apply a permanent dressing, is the first pre-requisite we must adopt in the improvement of our treatment.

The methods usually taught and described most frequently in our text-books are Buck's extension, with some modification, the Hodgen apparatus, and a straight plaster-of-Paris cast, none of which meets the rational requirements for which they were in-

tended, and I believe that every man who will think carefully and unbiased, with due reference to position and muscular action, will see that Buck's extension is unsuited for fractures near the condyles or the trochanters. See figure 1 from Wyeth's Surgery, pages 173 and 174. And again, muscular action is not a mathematical problem, and I do not believe the man has yet lived or will live who can calculate accurately the amount of weight necessary to exactly overcome the action of the muscle in different limbs, or in the same limb at different times. And as these fractured ends of bones are hidden deep under the muscles, they cannot be observed. The weights, if too light, are ineffective and allow overriding. If too heavy, they pull the bones apart and are conducive to non-union.

Our Hodgen splint, being cheap and easy to apply, and feeling reasonably comfortable to the patient, often meets the requirement of the doctor or

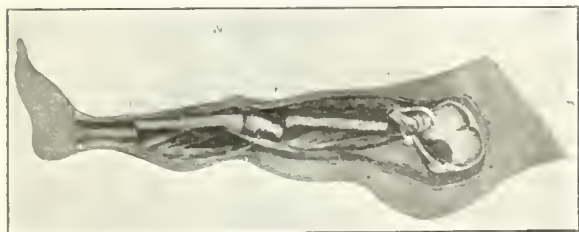


Fig. 1.

surgeon who contents himself with doing something just to relieve the suffering of his patient. This man has done the same thing that a surgeon would do if he administered morphine to a case of acute appendicitis—eased his pain and masked his symptoms. Let us see if this statement is true:

As I said in the beginning, we have been taught that the proper method of treating fractures is to bring the fractured fragments in apposition and hold them there. Suppose a fracture is in the upper third of the femur, our Hodgen apparatus supports only the lower fragment, and the upper one is left without any retention device whatever, and is held still or in place merely by the patient's holding still, otherwise the movement of the fragments is as certain as are the movements of the body. It appears to me from our teaching and my experience that both of these fragments should be fixed.

Now as to the extension and counter-extension. With one point of fixation in the ceiling of a room and the leg swinging in a trough by a rope at an angle of forty-five degrees, with the patient simply lying in bed, how can we maintain the exact distance between the ends of the fractured bone? For, certainly, he will "give" to the continual pull or traction, which must be considerable, if at all ef-

fectual; consequently, as he slips down in bed, overriding or angulation may be expected.

Our straight plaster cast is equally as unsatisfactory, because this method is open to the same objections in fractures of the upper and lower ends of femur as the Buck's extension, since muscular rigidity and action tend to produce deformity. (See cut, figure 1.) Our two points of fixation are too widely separated to get the best results, and



Fig. 2.

as time passes, the plaster crumbles against the perineum, and the cast, being straight and tapering, the muscles taut and rigid, the limb naturally telescopes into the cast with disastrous results.

After some ten or twelve years, with varying degrees of success by these methods, I tried to improve them, and in the *Journal of the American*



Fig. 3.

Medical Association, August 25, 1906, I described a method which I had devised after a thorough dissection of the varying ways we had been taught. I changed our reduction from human pulling and uncertain weights to careful, slow, steady, mechanical traction, until, by measurement and comparison

with the well limb on the opposite side, I was sure of perfect reduction. Then, second, I selected that position which placed the limb and muscles in the nearest approach to a restful position, promoting muscular relaxation, and in which we could force the long fragment of bone, over which we have control, to conform with the natural axis of the short one, which is often too short to be forced in line, and by so doing to produce angles in the limb that would serve as points of fixation between the ends of the bone that is fractured, instead of the whole limb. That is, in a case of fracture of the femur, by the angle at the hip and knee, we fix the distance between these points. The cast being angular, there can be no telescoping from above



FIG. 4.

downward, or from below upward. The same is true in a case of fracture of the tibia and fibula. The angle at the knee and the swell at the heel and instep produce fixed points that make shortening impossible, if it has been perfectly reduced and the cast properly applied. See figures III and IV.

In this way, if reduction is assured and the ends of the bones maintained exactly the same distance apart, as on the uninjured side, by the angle at the knee and hip, and coaptation is good, keeping the shaft in perfect line, subsequent traction or extension by any means whatsoever would be wholly unnecessary. To this method I gave the name of the *Double Angular Plaster of Paris Splint*.

The advantages offered by this method are many. As stated above, the position gives restful position and muscular relaxation, lessening the tendency to spasms of muscle, both of which are of great advantage, as muscular rigidity is a very important factor in producing overriding and deformity. In this position, with steady traction, the fragments will usually come into apposition if portions of soft

tissue do not intervene. This position prevents any telescoping of the limb into a cast when the swelling subsides or the limb shrinks, for neither upper or lower fragment can possibly move in these angles. It further controls any possibility of rotation, thus avoiding an inward or outward displacement of the foot.

This splint has the further advantage that, inasmuch as the patient is placed in a natural sitting position and the attitude assumed in the use of



FIG. 5.

crutches, it renders him much more comfortable, and gives him that freedom which, by any other method, is absolutely unheard of. This freedom of movement can be assumed as soon as the cast dries and the soreness from the primary injury subsides, which usually takes from three to six days. Also, it is especially a boon to the aged or otherwise enfeebled, among whom bed-ridden cases often terminate with such high mortality.

Also, if we are careful in the reduction and in the application of the cast, we may expect a fairly perfect anatomical and an absolutely functional result.

In my article in 1906, I described at some length a table with the top dropping or telescoping out of the way, so as to give access to the patient, meanwhile holding the hips fixed, and a device to maintain an equable mechanical traction. This was to

facilitate the application of a plaster of paris cast under traction in any position, without any movement of the patient whatsoever. I may add in this connection that I think the profession thought I was describing a table or a piece of apparatus for commercial purposes, whereas what I was actually doing was proposing a method of treatment which offered much to suffering humanity.

The Application. To get the best results, a double angular plaster splint must be applied in sec-



Fig. 5.

tions; two in fractures of the femur (see figure III, first section) and three in cases of fracture of the tibia and fibula (see figure II). The reason for sectional application, is that traction must be made over the plaster, and the section over which the traction is made must be put on and allowed to partially set or it will dent in and harden with depressions. These are likely to cause pressure sores, pain, and possibly deformity. Here is the stumbling block. Plaster casts have always been applied to the limb straight, and from below up without interruption, and it is hard for most of those to whom I have explained this method to see why the sectional application of the plaster is necessary, but the above explanation, I hope, will suffice. Again, it has been our custom to keep the patient with fracture of the femur in bed from four to six weeks, at the least, and when we reduce

these weeks to days, we put another stump in the road which is hard to get around. Also surprising, perhaps, is the statement that rarely is there pain sufficient to require an opiate after the first twenty-four to forty-eight hours.

For a long time I did not have access to a good x-ray machine and I could not show the end-result, but now that I have this machine, I can show results of which I am not ashamed. Yet I know that claims of such radical improvement over the old methods, from a man practically unknown to the profession and in such a small place as Gainesville must naturally be taken with a good deal of doubt, but I hope time will clear away these fears and give to this class of unfortunate humanity what is justly theirs—a very much diminished pain;

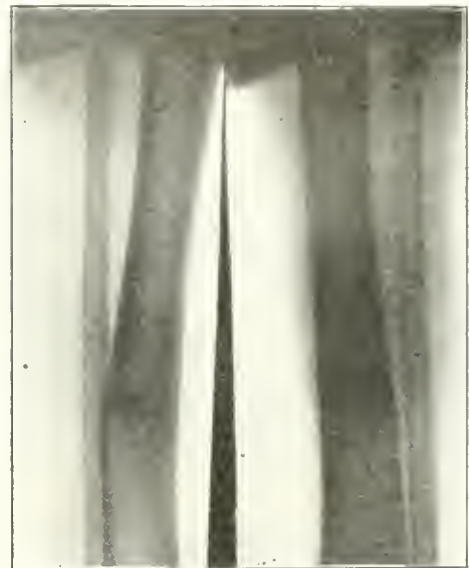


Fig. 7.

freedom of almost any movement without fear of pain or displacement of the fragment; almost perfect anatomical and an absolutely perfect functional result in the end, and this in from sixteen to twenty instead of thirty-two to forty weeks.

Technic. In case of fracture of the tibia and fibula, apply first, a plaster slipper to just above the ankle and then a stovepipe-elbow-shaped plaster cast, with the knee flexed, from two or three inches below the knee to midway of the thigh (see figure II). Allow these to partially set and apply extension and counter-extension by some mechanical device that will pull and hold the fragments in place until the interspace can be filled (see figure II). At the points of union at the upper and lower end of the middle section, I use wire gauze interwoven between the layers of plaster to make the unions firm. Then, after the plaster has sufficiently

set to prevent displacement, go over the whole cast with a couple of layers of fresh plaster, thus completing the cast.

In the case of a fracture of the femur, only two sections are necessary. The limb is flexed to almost right angles at the knee, and the cast is applied in the usual way from the base of the toes to just above the knee (see figure III). After partially setting, the thigh is flexed on the abdomen and mechanical extension and counter-extension are made (see figure III) until by measurement and comparison with the uninjured limb of the opposite side, one is sure of the reduction. Then begin at the upper end of the first section and carry the other section up to the transverse nipple line (see figure IV), reinforcing at the hip with gauze wire and numerous turns back and forth with layers of plaster. At this point we must make the outer portion of the cast doubly strong, as we only have two-thirds of a circle which otherwise makes the cast

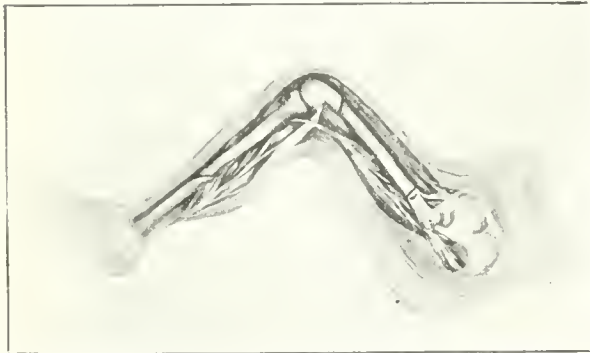


Fig. 8.

weak at this point, and the getting in and out of bed and the early use of crutches puts undue strain on it. If these precautions are carried out, we need have little fear of a break or reapplication of the cast under four or five weeks.

Figure I shows deformity produced by rigid muscular action, and Figure VIII shows the relaxed state of muscles and how readily the long fragment will conform to the natural axis of the short one.

Figure IV gives the complete permanent dressing for any fracture of the femur, regardless of location; and in compound fractures a window can easily be cut in the cast for dressing wounds, while the perfect fixation afforded by the angles at the hip and knee makes it almost ideal for these cases.

I append a few case histories and skiagrams showing results one year or more after accidents.

L. B., aged 18. Fracture of the middle of the femur, resulting from being thrown from a buggy by a frightened horse, on August 23, 1912. Fracture reduced and permanent dressing applied two hours later. On the 26th the patient got up, and,

with the assistance of a couple of nurses, walked to the front veranda, where she spent the remainder of the day; and she did not stay in bed any more during the whole process of repair except at night. She had but one injection of morphia after the permanent cast was applied. The cast was removed October 15th. Crutches were used for a couple of weeks longer, after which time she attended to her usual household duties with little discomfort of a slight stiffness in the knee from a contracted condition of the muscles, which soon disappeared under daily exercise. By December 1st she had no physical reminder of having had a fracture at all (see figure V).

R. P., age 37, farmer. Fell from a scaffold February 25th, suffering an oblique fracture of the upper third of the femur. Was put in a Hodgen's splint until March 1st when, under mechanical traction, the limb was pulled out some two inches from the shortening which had occurred up to that time, and the double angular plaster splint was applied from the base of the toes to the transverse nipple line. The patient was put to bed, had a good night's rest, got up, ate breakfast in a Morris chair the next morning, and sat up eleven hours. He went to the toilet to move his bowels as usual, and did not stay in bed except at night during the process of repair. The cast was removed permanently on April 15th, and on May 19th crutches were laid aside for good. This patient drove his automobile back and forth to town during the fourth week, and rode around over his plantation in a buggy from this time until after May 19th, when he was able to resume his horse-back riding. The results of this case are shown by the skiagram (figure VI). The point that gave him the most discomfort was a splinter of bone which slightly penetrated the soft structure. Had it not been for this, the patient would have been perfectly comfortable by August 1st; but the end-results are almost anatomical and absolute functional.

V. G., aged 16, March 18, 1913, was run over by a wagon containing two thousand pounds of fertilizer. Both tibia and fibula were broken, the limb being bent almost at right angles. The patient was put in the usual angular splint six hours later. The fourth day he was allowed to walk about the house on crutches. On May 10th, the cast was removed, and on the 25th the crutches were laid aside. The accompanying skiagram (figure VII) shows the end-result, eighteen months afterwards.

RADIOGRAPHY IN FRACTURES.

Too often the attending surgeon, who is usually the "family physician," with a most laudable desire to spare the patient expense, does not suggest, or at least does not urge a Roentgen examination, and finds too late that the "bones have slipped" in the dressing, as he supposes, and a permanent impairment or deformity is the result. Has he not subjected this patient to a far greater expense than the cost of the examination?—A. L. GRAY in the *Virginia Medical Semi-Monthly*.

FRACTURES OF THE FEMUR.

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General Considerations. A fracture of any bone of a living human being is not simply "a solution of the continuity of the bone," but an injury which, in the large majority of instances, is a complex traumatic condition, consisting of the break in the bone and injury to the *soft* tissues of the part involved, of greater or less severity. In some cases the injury to the soft tissues is of more importance than the fracture of the bone itself, in the majority of cases the injury to the soft tissues is of great importance; and in no instance, except perhaps in the rare cases of so-called "green stick fracture," may they be neglected or forgotten in treating the case.

The cause of fractures is usually stated as (a) direct and (b) indirect violence. A great deal of rubbish has been written and taught about "causes of fractures." Unquestionably a fracture may be produced by force sufficient to overcome the static resistance of the bone, applied directly to a region supported by the bone. About this there can be no controversy. In civil life fracture by direct violence is comparatively rare. Fractures by *indirect violence* are the ones about which anatomists, mechanics, and all sorts of doctors have talked, taught and controverted.

I have analyzed the conditions, and histories of a large number of indirect violence fractures and I feel sure in nearly every instance the fracture of the bone, *if it were a long bone*, was produced by *in coordinate leverage*.

When a human being uses his extremities voluntarily for motion and locomotion he accomplishes these acts by coördinate leverage, the motion to the levers (the bones), being applied by the coördinate use of the proper muscles. If taken unawares, the position of the extremity, part of the extremity, or the trunk, may be such that even slight momentum results in violent incoördinate leverage and a fracture may result.

Diagnosis. Distortion, "false mobility," great pain and local tenderness, ecchymosis, swelling and crepitus, if all are present in any case one may easily conclude a fracture has occurred. Sometimes distortion is difficult to appreciate, no crepitus is felt, and there is fixity of the extremity or part of the extremity, only great pain and local tenderness is present, perhaps considerable swelling and some ecchymosis. Such cases may be extremely difficult to determine especially if the lesion be near a joint.

To resolve the difficulty by manipulation and make a positive diagnosis immediately in such cases, sometimes is absolutely unnecessary, it is harmful in many cases, it is barbarous in others.

Careful ocular examination and *comparison with the uninjured limb*, if the uninjured one is a normal member, careful measurements and the greatest possible manipulation, continued for only a very short time, may be employed. If this does not suffice to establish the diagnosis, fixation in the position assumed by the extremity should be secured and a radiographic investigation by a competent operator should be made as soon as practicable.

Prolonged manipulation and careless handling or forceful attempts to elicit crepitus should always be avoided. The dreadful pain from these methods of diagnosing causes spasm of the muscles and on account of the incongruous positions which follow may make the determination doubly difficult.

In obscure cases difficult to diagnose, if manipulation is necessary to establish the diagnosis, it should be postponed until the physician is prepared and ready to make his permanent dressing, then a general anesthetic should be given, if the patient's general condition will admit of it, and setting should immediately follow the manipulation, or better still the manipulations should accomplish the setting, and the permanent splint or dressing be applied at once. Much better however is it to reach the correct diagnosis by a skiagram or by fluoroscopic examination. I very much doubt that a physician who cannot give his patient the benefit of a well taken skiagram or himself be able to make a fluoroscopic examination should, in these modern days, attempt to treat major fracture cases.

What was said in the opening paragraph in regard to fractures generally is particularly true of fractures of the femur. These cases are serious, complex injuries and one in treating them must not lose sight of this fact.

The first thing to do is to find out the condition of the individual as regards his strength, condition of shock, manifestations and result of his pain, etc., etc. The general requirements should first be done, then the special ones be attended to.

Shock in many cases is marked and requires care and discrimination in managing it. The early shock, that which comes on immediately after the injury, is a psychical one or due to "anoci associations." This is best treated by morphia given in full doses. Persistent or late shock means hemorrhage as a rule. This may require exploration by incision, and packing of the lacerated cavity, or ligation of bleeding vessels.

Pain and muscular spasm are the special ever-present and overpowering immediate sequel of fractures of the femur. The pain is so severe and trying in many cases it rapidly exhausts the patient. The position of the fragments sometimes aggravates the pain. One should try rapidly and gently to ascertain in a general way whether the fragments are pressing against the skin or the nerves and place the limb in such a position that this pressure shall be relieved. Then give a full dose of morphia, and immobilize and fix the extremity, unless one is prepared at once to reduce and splint the fracture. In this latter case a general anesthetic should be given and all manipulations be done in anesthesia.

In complete fractures of the shaft of the femur there is always more or less hemorrhage. I have seen tremendous extravasation of blood subcutaneously and between the muscles in some cases. One should estimate the severity of the hemorrhage by the tension and general quality of the pulse, and by the size of the hematoma about the fracture, and should direct his measures accordingly.

Active stimulation, hypodermic or proctoclysis, and in a few instances intravenous saline solutions, must be used. Unless the physician has the benefit of a well-equipped operation room and thoroughly aseptic technic he should open the soft tissues by incision to control hemorrhage only in instances of direct necessity; these instances will be very rare. A tourniquet or elastic bandage should be used only when nothing else avails.

The first aid or preliminary treatment should be only gentle extension, and fixation of the limb in extension until the patient may be taken to, or tided over for, his permanent dressing.

Prolonged attempts at reduction or manipulations for the establishment of the accurate relative positions of the fragments when the examiner is not prepared immediately to put on his permanent or final dressing is reprehensible because it is unnecessary and brutal.

When the patient must be transported the limb should be fixed in the position in which it is found, unless the fragments are evidently pressing on the skin or on some nerve trunk. In the latter case sufficient variation of the position must be made to relieve this pressure, then the limb should be fixed.

Except in cases of fracture of the neck, within the capsular ligament, a general anesthetic should be employed in manipulating and reducing the fracture. This is best even in cases where Buck's extension or some variation of the Buck's extension is to be used.

It must always be borne in mind that no two cases

of fracture are exactly alike. For this reason the same apparatus cannot without modification be used with different individuals, even though the fracture of the bone seems exactly alike. *The apparatus must be adapted to each individual case and not the case to the apparatus.*

Treatment of fractures of the femur. It should always be borne in mind that text book statements are at best average statements—more clearly as regards fractures, they, as a rule, try to note what the ordinary displacements, signs and indications of a particular fracture should be. Usually these statements are based on anatomic and mechanical considerations entirely. The physiologic and pathologic forces are not usually recognized or regarded. For instance, fractures of the upper third of the shaft of the femur are followed by upward and outward displacements of the upper fragment, and upward and inward displacement of the lower fragment, according to the books, and anatomically it should be so. As a matter of fact, in one case at least, I have seen almost the reverse condition.

Displacements and distortion in every case will depend upon the extent and severity of the injury to the contiguous soft tissues. A muscle which ordinarily should produce a certain special deviation of the fragments may be almost or completely paralyzed by the severity of the injury, and another muscle which ordinarily cannot successfully oppose it may be stimulated to tetanic spasm and by its super violence produce an entirely different or widely varying distortion and displacement from that the books and ordinary experience have taught us to expect.

Again, most of the innervating nerves may be severed, or the main nervous trunk be almost crushed by the leverage and weight of a fractured long bone. Paresis of the muscles may follow; gravity and leverage alone will then determine the displacement. Congenital or acquired previous distortions also influence displacements. Therefore a safe postulate for handling and treating any case of fracture of the femur is, *never take anything for granted. Determine each individual case accurately and carefully and treat it according to its individual requirements.*

Some years ago I was called in consultation and asked to reduce a fracture of the lower third of the femur in the case of an old man. The physician in charge told me he had tried repeatedly, always unsuccessfully, to reduce the fracture. It was a fracture almost transverse and the old gentleman was rather thin. I thought by etherizing him I should certainly be able to reduce and retain the fracture

in place. I was astonished and greatly chagrined to find that my assistant and I by any of the ordinary means and methods could not reduce the fracture. Finally it occurred to me to examine the uninjured lower extremity. I found the most exaggerated case of bow legs I had ever seen. This gave me the necessary indication. By changing the direction of the traction and using a fulcrum just above the kneejoint, the adjustment was quickly and easily done.

Treatment of the fractures of the several parts of the femur.

1st. Fracture of the neck: This fracture usually occurs in old people or in middle-aged women, unless it is produced by direct violence.

In the senile cases it is commonly intracapsular. When it occurs in healthy adults, the fracture is apt to be near the junction of the neck with the shaft and it is partially extracapsular, especially posteriorly.

This last form may be impacted, the former never.

The age of the patient, the history of the case, viz., a sudden trip and fall followed by inability to stand, great pain in and about the hip, sometimes running down to and also felt in the knee; extremity easily moved at the hip by manipulation, eversion of the foot, shortening of the extremity, elevation of the trochanter major shown by Nelaton's line or Bryant's triangle, local tenderness, great pain when the extremity is moved, especially when rotation is attempted, will serve to make the diagnosis, provided one may exclude fracture of the pelvis about and including the acetabulum. It is not necessary to attempt to obtain crepitus, to do this is very painful.

The fracture at the junction with the shaft usually shows crepitus by even gentle passive movement. This, in addition to the signs indicated above, will make a diagnosis of fracture easy, but it is not always easy to differentiate between the two, even though one remembers that crepitus is much more easily elicited in the latter than in the former case. A good skiagram may be necessary to clear up the diagnosis.

Treatment. Senile cases demand attention to their general condition at once. They are usually in shock on account of the great pain produced, and will require full doses of morphia the first twenty-four hours. While it is true that some old people do not stand confinement in bed well, it is not true of all cases by any means. One must early judge this feature and be guided in his treatment by this determination. As a rule, a dressing and apparatus

should be employed which will enable the patient to move about a little in bed and to change position from time to time. It is rigid fixation in one position in bed and pain which proves so exhausting to old people. Strong traction and the necessity of remaining fixed on the back is very irksome, and is apt to be painful, hence the ordinary traction devices should not be used for any length of time in cases of old people.

I have found the old Hodgen splint or the Nathan Smith wire frame splint most useful in cases of fracture of the neck of the femur.

When the fracture is at the junction of the head and neck, I use more than 45 degrees of abduction in some cases, as suggested by Royal Whitman, with the injured limb swung free of the bed and supported in the Hodgen apparatus, and this in turn held by an overhead bar. Traction may be had by so arranging the cords which attach the splint to the overhead bar that they are continually drawing downwards. That is, towards the foot of the bed. This is necessary in most cases to overcome the spasm of the muscles and to relieve the grind on the head of the bone.

I have recently treated a very unpromising case in this way with great comfort to the patient, and with a very successful and happy result of the treatment.

For the fractures of the neck at the junction with the shaft, the overhead bar should be only a little obliquely placed as regards the bed, so as to obtain very little abduction. Swinging entirely free of the surface of the bed, suspended, and continually in traction, the limb is comfortable, and the apparatus permits great freedom of movement of the body of the patient and many changes of position. The patient may sit up in bed and use the bed pan without difficulty. In a sunshiny, well-ventilated room, near a window, an old person can stand this apparatus in most instances six weeks without serious detriment.

Cases which will not endure this method of treatment should have adapted an extension apparatus like the Hutchinson hip-joint brace, or the Thomas brace, and be taken out of bed, placed in a comfortable wheel chair and wheeled into the fresh air. Massage and alcohol rubs are very grateful and useful adjuncts to the treatment.

Some preparation of nux vomica internally, careful feeding and *diversion* are also very useful in these cases.

Fractures of the upper third of the femur. These fractures are quite common, especially in children, and are the most difficult of all fractures of the

femur successfully to treat without an open operation.

The signs and symptoms are usually quite classical in these fractures: no difficulty is found in diagnosing a fracture, but it is difficult, especially in a stout, fat or full-muscled person, to determine whether the fracture is oblique or spiral. It is nearly always one or the other.

The tilting upwards and outward rotation of the upper fragment may be overcome by general anesthesia, which relaxes the spasm of the muscles, and one may accomplish a fair restitution of the fragments, but it is very difficult to hold them in proper place afterwards. In children this may be done by a well applied plaster cast put on in anesthesia and reinforced by flexible wood strips laid in on the anterior and outer surface, and carefully fitted and snugly applied from the knee to the umbilical region. Occasionally one may succeed with a similar dressing in cases of thin, weak adults, but for strong, robust individuals, in order to preserve the position of the fragments, it will be necessary to employ a system of downward and outward cross traction, with powerful extension of the extremity by weights, like the Bardenheuer method. I think a better method is to use the Nathan Smith anterior wire frame curved at the knee so as to obtain flexion at the knee. Bandage it carefully in place and then suspend the extremity in a sufficiently rotated position to meet the displaced upper fragment.

In a recent case in which there had been extensive superficial lacerations and serious infection, we tried all manner of dressings and positions, without being able to retain good apposition. On account of the infection, no open operation could be employed. The child (nine years old) nevertheless obtained good union (though the fragments overlapped) and had a perfectly useful limb afterwards. I shall return to this point later on.

As was said before, this is the region of the femur which, when a fracture occurs, an open operation for replacing and directly plating the fragments themselves is indicated.

Fracture of the middle third of the femur. These are the most frequent of femoral fractures. Easily diagnosed as a rule. I have no record nor can I remember ever to have seen but one incomplete or green stick fracture of the femur; this was at this region. Usually they are oblique or spiral; they are sometimes transverse, however. The lower fragment is usually drawn upwards above the end of the upper fragment, but it may lie in any position as regards the horizontal directions. I have seen anterior, posterior, internal and external positions

of the lower fragment as regards the upper fragment. It all depends upon the nature and extent of the injury.

Middle third fractures are usually considered the ones especially requiring some form of traction method for their treatment. Except in a few selected cases I have quite lost my preference for traction methods of treating these fractures, since skiagrams so persistently showed me overlapped fragments, inaccurate apposition and nearly always a little angulation, as a part of my result. Besides a stiff, painful knee joint is apt to persist for many weeks.

For transverse fractures, I have had better results with a plaster of paris fixed dressing after reduction in general anesthesia. This should be removed in three weeks, the limb carefully washed with alcohol, massaged, the joints very carefully moved, and another plaster dressing applied.

Also for oblique or spiral fractures in most instances the plaster splint applied in complete general anesthesia is best and most comfortable. These splints should be applied while the limb is powerfully extended by means of a Lemon or a Lambotte apparatus. Manual extension cannot be kept up unvaryingly for a sufficient length of time. If one has the benefit of a first-class modern fluoroscope to see just what he is doing, he will be very fortunate indeed.

For the traction method I have been accustomed to use for many years a modification of the Volkman leg and foot piece to prevent rotation of the foot, and to lessen friction. My apparatus consists of a leg and foot piece, which is bandaged to the leg and foot after the adhesive plaster strips have been laid on. Cross pieces go out on either side from under the leg piece and ride on two pieces of hard wood planed to a narrow edge. These are made like an ordinary railroad into flat sections, of varying sizes and lengths. This apparatus raises the leg and foot a little, keeps them off the bed and slides easily in the running grooves on the track of hard wood. When properly applied the apparatus keeps the foot constantly in proper position and prevents any deviation of the leg.

In some instances Steinmann's nails may be used for extension. I must confess to a prejudice against this method. I prefer plating the fragments when any operation is necessary.

While the little operation of thrusting an aseptic nail through the extremity, including the bone, may itself be attended by little danger, it is quite a different matter during the weeks of traction on this nail, for the tissues must be irritated by the pull

and movements produced by the varying position of the patient, and infection is very apt to follow the irritation.

After any method of reduction and dressing, especially after a fixed dressing, such as plaster of paris, has been put on, a skiagram should be taken or a fluoroscopic examination be made to find out clearly whether the fragments are held in good position. Overlapping to a slight extent in cases of oblique and spiral fractures will not very much hinder good union and satisfactory function afterward, provided there is no angulation or rotation of the fragments on the proper axis of the bone.

Overlapping in cases of transverse or short, irregular oblique fractures will make a great difference, however, much deformity, doubtful union, and usually long delayed and never complete function will result. Finding this after attempting to reduce and fix a fracture, another attempt should be made, and if again unsuccessful in resorting the fragments to proper position, my rule is to operate.

Whatever apparatus is used, in about three weeks at least, the limb should be carefully inspected, carefully washed off with alcohol and massaged. The ankle joint should be slightly moved and the knee joint should also be flexed as much as practicable without provoking spasm of the muscles and displacement of the fragments.

In many instances a surgeon waits too long before he begins massage and passive movements. I would not go so far as Championniere in regard to massage in fractures, but it seems to me it should be employed as early as practicable.

Fractures of the lower third of the femur. The diagnosis of these fractures is usually easy. The displacement of the ends of the fragments follows the general rule of fractures of the femur below the upper third. The lower fragment is usually drawn upwards as regards the upper fragment (except in cases of the specific fracture to be mentioned presently); unless they are badly lacerated, the abductors are very apt to draw the upper fragment inward. In which case the lower fragment will be found displaced upwards, a little backwards and to the outside.

There is a fracture, however, usually transverse, the displacement of which is, lower fragment displaced backwards and tilted so that the end presses backwards into the upper part of the popliteal space. This fracture is produced by the whirling motion caused by a rotating wheel. Children who jump on wagons and whose lower extremity is caught in the wheel, and workmen caught in slowly-

revolving large machine wheels, have this special kind of fracture.

The condition is a very characteristic one. It is an extremely painful one because the end of the lower fragment presses firmly against the blood vessels and nerves which pass through the popliteal space. Also grave injury to the vessels may result from this pressure. It is therefore necessary to reduce this fracture very soon to prevent thrombosis in, or laceration of, the vessels. If it is not practicable to reduce the fracture at once, the leg should be flexed at the knee and immobilized in this position until an anesthetic may be given and reduction accomplished.

One must have in mind that this fracture is the analogue of fracture of the lower third of the hu-



merus just above the condyles. Jones of Liverpool has taught us that to reduce and hold the fragments of the humerus in place it is necessary to actually flex the forearm on the arm and fix it in this position. A similar method of reduction should be used in the supra condyloid femoral fracture, namely, extreme flexion of the knee joint and manipulation of the lower fragment into place. Ordinarily this may be accomplished, and when reduced, as it is a transverse fracture, one has only to jam the fragments end to end and have them held in this position while the leg is slowly and carefully brought to its proper position. A fixed dressing of plaster of paris may then be applied.

When the violence has been great, however, the displaced lower fragment may be caught between the heads of the gastrocnemius and the hamstring tendons, and lacerated shreds from these fibrous structures may be so wrapped about the ragged ends of the fragments that they will be firmly held and no manipulation or position will suffice to release them. In this case an open operation will be necessary in order to obtain good restitution of the fragments.

Ordinary fracture of the lower third may be treated by traction methods, with Hamilton's coaptation splints to prevent deviation. For children and for some not very strong and thin adults a fixed dressing of moulded splints, preferably plaster of

paris, applied in general anesthesia may be used to advantage. When the plaster has hardened, the extremity may be swung clear of the bed by attaching bandage supports and cords carried to a bar above the bed. When the reduction has been good, the method of treatment is a very grateful one. Skiagrams should be taken soon after the dressing is applied in order to be sure of the reduction.

End-results of fracture of the femur. Up to this time there has not been established any authoritative standard by which surgeons might compare their results after fracture of the femur.

In 1890 the American Surgical Association appointed a commission to determine and report what should be the conditions which should be considered as indicating good end results after fractures of the femur.

The summary of the report of this commission is as follows:

1. There must be firm bony union.
2. There must be correct axial relations of the fragments.
3. Correct relations of the anterior planes of the upper and lower fragments must be maintained.
4. Shortening must not exceed from one-eighth to one inch.
5. Lameness must not result as a consequence of shortening over one inch.
6. The conditions attending the treatment, however, may prevent these satisfactory results.

This is a standardization from an authoritative source, certainly, but it was made before the era of *x-ray* and the surgeons of that time did not practice open methods for the treatment of fractures.

This year the American Surgical Association has a committee working on this matter of standardization. It is to be hoped that this committee will be able to formulate a summary which will bring the conditions up to date.

Taking, however, the above standardization as existing at present, what is the average result obtained by surgeons who treat fractures of the femur?

In 1912 I made a study of 760 cases of fractures of the femur, collected from many surgeons. Unfortunately, the records of these cases were so incomplete in most instances, it was impossible to deduce accurate data from them. Seven hundred of these cases were reported to have made satisfactory recoveries. I presume this may mean that 700 out of 760 cases had bony union.

In regard to the second condition, namely, correct axial relation of the fragments, 620 cases had

this point noted, 114 of these cases (or 18.1%) had serious axial displacements.

The third condition was not noted.

The fourth, the average shortening of the reported cases, did not exceed one inch.

This matter of shortening, however, is a very uncertain one. It is well established that a man's femora are rarely the same length. Sometimes they vary, in what seems normal conditions, as much as one inch. I have a child, a thirteen-year-old girl, under treatment now, one of whose femora is one and three-eighths inches longer than the other. This is a case of unequal development, apparently, however, with the same conditions of the legs on both sides, and like conditions of development, etc.

Then, too, measurements are frequently very carelessly and inaccurately taken and may not be trusted. Therefore, unless the fifth condition, namely, lameness results as a consequence of the shortening, or serious tilting of the pelvis and spinal curvature develops as a consequence, I think not more than one inch may be taken as a good *functional* result. If there is this much shortening as a result of the fracture, it is surely due to overlapping of the fragments. This will require a large callus to assure firm union, and this in turn will produce some deformity and usually cause a good deal of pain for some time.

One must now bear in mind that the almost universal use of *x-ray* and the demand of a patient to have a print of the plate, require of the surgeon not only a good functional result, but a good mechanical and cosmetic result also.

In the report on the 760 cases of fracture of the femur, only 130 were reported as skiagraphed, 83 of these, or 63%, showed good apposition. These *x-ray* cases came from the best and most systematic surgeons and cannot be considered the average result obtained by all surgeons by any means. Also, if I may judge by my own experience, this does not express the result of the old conservative treatment, but it is the average result of both methods, viz., conservative and open methods.

Of 299 of my own cases of fracture of the shaft of the femur, 100 of which were compound, comminuted or complicated fractures, the average shortening when they left the hospital was three-fourths of an inch.

All but one of these cases had firm bony union. Only about 2% of these treated by the conservative method showed accurate reposition of the fragments, when *x-rayed* after the permanent dressings were applied.

In one case of compound comminuted fracture,

when the fragments were cleared away, I found there was a loss of two and one-half inches of the shaft, yet this patient made a good functional recovery, and by the use of a high shoe was able to work again.

Axial displacement is a very serious matter in a final result. This not only is apt to lead to distortion of the pelvis and spinal column, but results in persistent pain in the ankle and knee joints and it usually incapacitates a man for further laborious work.

The cases I have been able to trace and follow up have only been about 30% of my fractures, these have been able to return to their former jobs. These cases had no serious axial displacements. When some time ago I found by the old method of extension, external splints, etc., etc., as I said, only about 2% of my cases showed accurate apposition, and in many instances cases which seemed in perfect alignment, and showed very little shortening by the usual methods of measuring, when skiagraphed exhibited overlapping and poor apposition, I became so disgusted that I began seriously to consider and to practice far more generally the operative method and direct splinting of the bone.

Of the last 48 fractures of the femur we have treated at St. Luke's Hospital, I find 21 of them were plated, nearly 50%, whereas four years ago only 7% were plated. So far we have had no fatality from these operations, and but one case has been seriously infected out of 41 cases operated.

From other surgeons I have collected 60 operated cases without a death, making 101 cases of fracture of the femur operated on without a fatality. It is evident, therefore, that the operation may be done without serious danger.

What are the advantages of the open method, and when or in which cases ought it to be used?

It will be better to take the last question first. In my clinic at St. Luke's Hospital it is the rule in simple fractures of the femur to attempt reduction in general anesthesia and while the patient is relaxed and unconscious to apply a permanent dressing. Then the fracture is x-rayed. If the reposition is not good, especially if the fragments are not in alignment, another effort at reduction is made and again an x-ray is taken. If again the position is bad, the state of affairs is explained to the patient and he is offered the operation. We find patients very rarely refuse to have the operation. Within ten days after the fracture the operation is performed.

If a physician must treat a case of fracture of the femur in a private house or in any institution

not equipped and ready for the most careful aseptic technic, and if he has not qualified himself to do thorough aseptic work, he should not for a moment consider any but one of the so-called conservative methods of treating the fracture. The open or operative methods in such condition, it seems to me, are never permissible.

Having had proper training and in a well-regulated, clean, modern hospital, a surgeon should decide in any given case whether the open or the closed method will be best for his patient. He must decide this matter promptly, that is to say, within ten days, for primary operations are much less severe as a rule, and are followed by better results than secondary or late operations are.

To treat the question dogmatically, I should say, fractures of the neck within the capsule should always be treated conservatively. The open method may be used on such cases only when the head has been dislocated from the acetabulum.

Fractures of the upper third offer especial and cogent indications for the open method.

Fractures of the middle third may best be treated by the open method if they are transverse, and cannot be reduced by general anesthesia, traction and manipulation. Oblique fractures which have short, irregular bevels or shoulders, and those which have markedly been displaced and have gathered on the ends and between the fragments a quantity of fascia, muscles, etc., are indications for the open method.

A fracture of the lower third, if it be one which has the lower fragment tilted backward in such a way that it has been entangled in the lacerated fibres and fascia of the heads of the gastrocnemius muscle and hamstring tendons and cannot be replaced under ether by manipulation and flexion, should as a rule be treated by the open method.

In general, a fracture of any part of the femur except its neck, which cannot be reduced in anesthesia, and retained in position by some proper apparatus by the middle of the second week, should have the benefit of an open operation unless there is a contraindication in the condition of the patient or some strong social or medico-legal consideration against it.

In determining the question of open or closed method, the surgeon should never forget that a finite operator doing an open operation on a human being can never be sure he is not introducing some sort of sepsis. There is, therefore, always a possible added danger in open operations.

Furthermore, open operation for fractures of the femur require large wounds and are not easy operations to perform. They may prove a serious tax on

the strength of a patient and must never be lightly undertaken.

The surgeon should not forget all this and he should make the patient appreciate the main factors of the probable result without the operations and its added danger if undertaken.

The advantages of the operation are (1) direct ocular examination of the condition of the fragments; (2) reposition and fixation by direct splinting of the bone while under one's eyes; (3) evacuation of the blood and detritus from about the fragments; (4) a condition almost painless during after treatment and convalescence; (5) much more freedom of movement in bed while convalescing; (6) earlier employment of passive movements and massage.

As regards results, our experience has been that the operated cases require a little longer period of disability, probably three weeks longer. The alignment is always good and very rarely does any bowing occur afterwards unless the patient is allowed to bear weight too early. In every instance, so far as we have been able to follow our cases, the patient has been able to return to his former job, except in one case, who refractured his bone while still in the hospital (a recent case), and he has not been able yet to return to his work. He has considerable overlapping and callus and shortening as the result of his last fracture, which was treated without operation.

The average period of disability for fracture of the femur worked out in our cases is thirteen months. This means the time a laborer may count as necessary before he may with confidence return to his hard work. Most cases leave the hospital in ten weeks, walking with the aid of a cane or crutches, but it requires a much longer period for them to be able to do a full day's work. Our follow-up system shows, as said above, the average time for full ability is thirteen months.

ALIGNMENT OF BONES BY FOREIGN BODIES.

I am certain that the application of any large foreign body to a fractured bone or the insertion of nails, screws or wire through and through the medullary canal, with the idea of fixing the bone in alignment, is wrong in principle and productive of much harm. The alignment can always be maintained by splints, or plaster casts, and the only legitimate use for any foreign body in the bone is to prevent shortening or to hold down the end of some short fragment that is tilted out of place by muscular action.—W. P. CARR in the *Virginia Medical Semi-Monthly*.

"FRACTURES ABOUT THE ANKLE."

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In the past physicians, surgeons, and even authors of some text-books of surgery have been content to regard all fractures about the ankle joint as "Pott's fractures." Percival Pott described his fracture in 1769. He described it as that of a fracture of the fibula, three or four inches above the external malleolus with a tearing of the internal lateral ligament.

The occurrence of such a fracture as described by Pott is infrequent, and the usage by authors and physicians of the term "Pott's fracture" to describe all fractures about the ankle joint is to be deplored. Ankle fractures are of many varieties. Wherever it has been possible in private or hospital practice, I have carefully checked up all recent cases of fractured ankles. In a considerable number of such cases I have not had to treat a single case of fracture of the fibula above the external malleolus that was not complicated by some other injury than a torn internal ligament. The usual complication of fractured fibula was a fractured internal malleolus. The force of eversion breaking the external bone, continuation of the forces or the dislocation inwards or backwards (inversion-adduction) of the astragalus, breaking off the internal malleolus with its attached internal ligaments. Dislocations of the astragalus or of the tibia alone do not occur without accompanying tears of ligaments or fractured malleoli. Fracture by inversion usually breaks the fibula about the ankle joint; if the force continues, the internal malleolus with its attached ligaments may be torn off. Internal dislocation of the astragalus may occur when both malleoli are broken or when the external lateral ligament is torn. Posterior dislocations are frequent in bimalleolar fractures. The external malleolar fracture, or fractures of the fibula above the joint, occurs frequently without appreciable tear in the external lateral ligament or fracture of the bony internal malleolus. In such cases there is slight dislocation (inversion inwards) of the astragalus, the strong external lateral and tibio-fibular ligaments being unruptured, and the fibula fractures above the articulation. A much rarer injury is that which occurs when the astragalus is driven between the tibia and fibula, tearing the tibio-fibular ligament, and many times breaking the fibula high above the joint. This, the so-called "Dupuytren's fracture," is due to direct violence caused by falls

from a height, high jumps, and allied injuries. These fractures may be complicated by a fracture of the astragalus or of the os calcis. Splitting of the anterior articular surface of the tibia often occurs with these fractures. Fractures of both the tibia and fibula occur very frequently, and many of these fractures are compounded. Some occur from direct violence, as from kicks, blows, and run-over injuries; frequently comminution occurs as the results of indirect violence.

In transverse fracture of both bones, the fracture in the tibia usually occurs just above the internal malleolus, that of the fibula slightly higher up. The lines of fracture in other injuries where both bones are broken may be oblique, from below upwards or backwards; they may be V-shaped, spiral, or T-shaped; rarely a longitudinal split fracture of the tibia occurs. The commoner forms of tibial fractures are the spirals and the obliques; these are indirect injuries, and they are very often compounded. Other varieties than the above-mentioned fractures may occur, but these are the commoner ones.

Fractures of the astragalus are not very common. They occur in falls from an extreme height or direct crushing injuries. The fragments in astragalus fractures are greatly displaced. Recently I have had to treat two cases of fractured astragalus, one occurring from the crushing of the foot under an automobile wheel, the other from a fall from a height. In one case I removed the entire astragalus, in the other nothing was done except to keep the foot in such a position that motion at the ankle was allowed.

The frequency and kinds of the various fractures may be noted in the following tables. Speed (*Surg. Gyn. & Obst.*, July, 1914) gives the following tables of fractures at the ankle, based on an x-ray study.

External malleolus alone	60
External malleolus with fractured internal lateral ligament as evidenced in skiagram	31
Internal malleolus alone	10
Both malleoli	47
Appreciable separation of interosseous ligaments	10
Both bones fractured above the epiphysis.....	12
Fracture external malleolus and epiphyseal separation	1
Lipping fracture (tearing of edge of the articular surface of tibia)	16

187

Displacements of Astragalus:

Inward	5
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Outward	25
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Backward	6
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Results after setting, using tibio-astragalar axis as basis:

Good	38
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Bad	27
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Colvin, of St. Paul (*Surg., Gyn. and Obst.*, January 14, 1914), analyzing sixty cases of ankle fracture in the services of all attending surgeons, gives the following table:

1. Fracture of the external malleolus of the fibula above the joint	16
2. Fracture of the internal malleolus alone ...	4
3. Fracture of both malleoli	27
4. Fracture of internal malleolus, and of fibula above the joint combined with backward displacement of the foot	3
5. Fracture of the internal malleolus, and splitting off of a considerable triangle of bones from the tibio, at the tibio-fibular junction	1
6. Split fractures of the tibia at the tibio-fibular junction of minor degree with no other fracture	1
7. Comminution of the articular surface of the tibia	1
8. Supramalleolar fracture	5
9. Fracture of the fibula and rupture of the internal lateral ligament (Pott's fracture)	1
	60

Results of examination of 36 skiagrams of cases of ankle fractures—Pirring:

Anterior splitting of the tibial articular surface	2
Fracture of external malleolus	2
Fracture of both malleoli	8
Fracture of the internal malleolus and of the fibula above the joint	4
Comminution of the articular surface of tibia	3
Supramalleolar fracture of both bones	7
Fracture of fibula above the joint, with dislocation outwards of the astragalus and rupture of the internal lateral ligaments (Pott's fracture)	2
Spirals of the tibia (near the joint).....	6
Spiral of tibia and fracture of fibula.....	2
	36

An analysis of these tables shows conclusively the unreasonableness of classifying and treating all cases of fractures of the ankle as Pott's fractures. The use of the Dupuytren's splint, the "Pott's fracture" classical splint is absolutely harmful in many

of these injuries. I submit, however, that it is the ideal splint for treating true Pott's fracture. It is also very useful in fractures of the fibula or internal malleolar fractures. I do not allow "Duytren's" splint to be used in other fractures about the ankle joint. My preference in these cases is for examination and manipulation under anesthesia, an x-ray picture having been taken. This examination should be made as soon after the injury as possible, and splints or plasters are to be applied while the patient is still under the influence of the anesthetic.

Ether, unless contraindicated, is the anesthetic of choice. Plaster that is applied on house flannel as a "Crofts" splint, seems to me to be nearer the ideal splint for these cases. This splint "Crofts" allows for the swelling. It can be tightened or loosened at will and permits of full inspection of the injured limb.

In considering a classification of injuries at the ankle joint the one made by Walton in a general classification of joint fractures seemed to me the best for methods of description as well as for treatment. He divides them as follows:

First: Those involving the articular surfaces of the tibia or astragalus.

Second: Those near to but not invading the joint surface.

Third: Those fractures associated with dislocations and tears in the ligaments.

The integrity of the ankle joint depends upon its ligamentous attachments, together with the mortise-like joint of the astragalus inserted between the external and internal malleoli. The articulation is between the lower end of the tibia and the astragalus. The strong inferior tibio-fibular and the interosseus ligament adds strength to the joint, through their action in holding the two bones together. Other ligaments pass from the posterior and anterior surfaces of the joint.

The problems requiring consideration under this classification of Walton would be in the first group. They concern the damage done to the articular surfaces and synovia, tears of the ligaments, tendons, or muscles; displacements or comminution of fragments; and, lastly, hemorrhage in the joint. Some of these cases of ankle joint fractures will be compounded, providing another serious problem to combat, that of infection.

In the second group we will have to consider all transverse fractures above the articulation, supra malleolar fractures as well as injuries along the epiphyseal line. This group will also include the V-shaped fractures, the oblique and the spirals of the tibia and fibula.

In the third group are all fractures of the malleoli with ligamentous tears ("Pott's fractures"), dislocations of the astragalus frequently occurs with fractures or when the ligaments are torn, they can conveniently be considered in this group. The dislocations of the astragalus may be internal or external, posterior or anterior. Wide dislocations of the astragalus usually mean bad tears in the ligaments or a fractured bone.

I have previously stated that I preferred "Crofts" splint or a simple plaster splint for treating those fractures of the ankle other than the Pott's fracture. "Crofts" splint can be utilized in holding the foot in any position desired. If inversion-adduction of the foot is wanted, it need only be allowed to harden in that position. If it is dorsi-flexion of the foot that is wished for, it can be fixed in that position. This splint allows of full inspection of the ankle and that is one of the great advantages.

Treat Pott's fractures by adduction-inversion. Treat bi-malleolar fractures first by reduction of the fragments and replacements of the astragalus, if it be dislocated, care being taken to have the center of the articular surface of the astragalus on the center of a line dropped from the tubercle of the tibia; now place the foot in plaster at right angles to the leg, having the foot slightly dorsi-flexed in order that the bones will be firmly held together; be sure the astragalus is brought forward, because posterior dislocation is frequent in bimalleolar fractures. Fractures of the external malleolus without damage to the internal or external ligaments will require only that the foot be put in plaster at right angles to the leg. A slight amount of adduction-inversion is of course desired in order that through the external ligamentous pull the ends of the fibula will more readily come into apposition. The amount of adduction and inversion used is only about one-third of the adduction-inversion used in the treatment of a Pott's fracture.

What class of cases will require an operation for good results?

1. The spirals that cause great tearing of tissues and displacements of the fragments.

2. Impacted fracture of the tibia into or near the joint.

3. Posterior or anterior splitting fractures of the articular surfaces of the tibia, with dislocation of the astragalus. These are always complicated by torn ligaments.

4. Transverse fracture of both bones near the ankle-joint where it is impossible to immobilize or retain the ends in apposition. These cases may often require division of the tendo Achilles for a perfect result.

The operations done in some of these cases is simple incision and replacements of fragments. This is to be preferred. In other cases autogenous grafts from the patient's opposite shin, wire screws, plates, or nails may also be used. The astragalus is always put in alignment with the tibia. The fibula can be ignored in many of the cases, or it can otherwise be reduced by external manipulations. A retentive dressing is always required in the cases operated upon. It should be continued from three to five weeks. No weight-bearing should be allowed in ankle fractures for from seven to ten weeks. When the patient does begin to walk the heel of the shoe should be raised on the inner side so that all of the body weight is deflected from the inner to the outer side of the tarsus.

One other class of cases is still to be considered, viz: the compound fractures.

I treat these expectantly, at least for a time, until I can determine just what degree of infection is going to occur. Under an anesthetic I gently cleanse the leg with wet gauze. I do not irrigate. I then replace the bony fragments with instruments (fingers should not touch the bone). Then I cover the bones with skin and soft tissue. The leg is dressed with gauze saturated in alcohol 65 per cent., camphor 5 per cent. A cage splint of wire or a box splint is applied. Repeatedly during the days following, this solution of camphor and alcohol is poured over the dressings to keep them soft and moist. Later a radiograph is again taken. If the apposition is good and no infection occurs I apply the Crofts splint, cutting out a window or splitting it to allow dressing of the wound. If infection occurs but the apposition of fragments is good I am inclined to continue immobilization as best I can. Many of these cases will eventually overcome the infection, and union will then occur. A foreign body placed on a fracture already infected can do no good; it will do harm in prolonging infection and delaying union.

What are some of the end-results of the present-day treatment in ankle fracture?

Traumatic flat-foot is very common, a weakened arch, a weak everted foot, toeing out of the foot, broadening and stiffening of the ankle joint, and sometimes dropped ankle. Contractions and stiffening of the muscles and tendons and imperfect dorsi-flexion are some of the poor end-results. I attribute many of these poor results to a faulty diagnosis and faulty methods of treatment, together with the too early return to weight-bearing before the tendons have had time to unite properly and before the new callus has had sufficient time

to harden. The time of bony union cannot be arbitrarily stated. In my experience the average case requires from seven to twelve weeks, exceptional cases longer. A much longer period may be required for firm union of tendons. An ankle that shows pain on finger pressure along the fractured bones, or when attempts at weight-bearing cause much pain, is not ready to be used. It is not ready to bear even the slightest weight through the aid of crutches. Gentle massage, hot dry packs, hot oven bakings, together with active and passive motion will hasten repair of the tissues and relieve the pain and congestion. Dorsi-flexion is to be practiced by the patient. Lateral motion should be performed by the nurse or physician in charge.

Robt. Jones (*Amer. Jour., Orthopedic Surgery*, Vol. XI, page 334, October, 1913) says of fractures of the leg that there is little to be said until the lower fourth of the leg is reached. Fractures above this are comparatively easy to handle, even if both bones are broken, but fractures of the lower fourth of the tibia or of both bones in this region are extremely difficult to control even if the tendo Achilles be divided. The slightest error of alignment may mean constant pain and weakness in the ankle for months afterwards. Although I approach most other fractures with confidence that I can treat them successfully by manipulation, I feel that in fractures of the lower fourth of the tibia and fibula operation is usually the wisest course for me.

In conclusion, I would therefore essay to help reconstruct some of the views now held concerning the seriousness of fractures about the ankle. The novice feels able to treat these but runs away from the easier thigh cases.

In all cases of ankle fracture carefully investigate them by the use of the X-ray. Examine and reduce all cases under an anesthetic. There is no routine appliance or splint to be used recommended, nor is there a method of operation advocated to the exclusion of all others. What is absolutely required is that a careful study of each case should be made under the guidance of the X-ray, and that reduction must be under anesthesia. When this is done, each of us must then decide for himself whether by an open operation or by manipulation he can best reduce and retain the parts in their former relations. In the past physician and patient have been resigned to some deformity in fractures and certain functional losses. In the future, yes even now, the public and the law courts are demanding of surgeons the conservation of anatomy as well as of function. The surgeon is not so much interested in a slight deformity if function is good. He

should, however, be greatly interested in the disabilities arising from these injuries. The nearer the end-results of our treatment approach to the anatomical, the more certain are we to retain function.

THE PREVENTION AND TREATMENT OF THE DISABILITIES FOLLOWING FRACTURES OF THE LIMBS.*

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During the last few years I have had under my care a great many patients suffering from disabilities due to fractures of the limbs. This has impressed me with the frequency and seriousness of such disabilities; and as the first step toward their prevention is a knowledge of their origin, I venture to bring before you this subject, which I believe is of prime importance. In fact, I cannot but believe that, taking fractures of the limbs in general, the results of treatment are less satisfactory than they used to be. And I think this is so not alone because we have advanced our standards of what shall be considered good results, but also because our treatment is less efficient than in former years. This state of affairs, perhaps, may be attributed to the comparative lack of interest in, and neglect of proper instruction of students concerning the treatment of fractures during the decade, let us say, from 1900 to 1910. This was a period during which the interest of the surgical side of the profession was concentrated largely upon abdominal surgery; it was a vast and fascinating subject, which had just begun to reach its stage of mature development, and in society meetings, clinics, and the class room swept everything before it.

During this wave of enthusiasm interest in dry bones lagged, and it was not until within the last four or five years that bone surgery, and especially the subject of fractures, began to be restored to its former state of importance. The consequence is that most students of medicine who began their practical work during the abdominal decade knew little or nothing, and cared less, about the pathology or treatment of fractures.

It is unfortunately true that in the present state of civilization in this country, as indeed everywhere else in the world, it is still necessary for the general practitioner to have under his care every year a number of cases of fracture; he simply cannot avoid it. No doubt it would be much better for

the patients if all cases of fracture could be referred to surgeons taking special interest in such work; and I think it is not to be disputed that whenever possible it is the duty of the family physician to send such cases to such a surgeon, and not to attempt to treat them himself. This course of action, however, is possible only in populous communities; and the grave responsibilities which must be assumed by the country practitioner, who must indeed be not a "jack" but a "master" of all trades in the profession, render his lot most unenviable.

But as it is impossible to know in advance which students of medicine will be able in after life to avoid having fractures under their care, it is necessary to insist that all shall receive adequate instruction in this, as in all other fundamental branches of medical science and art. I believe the tendency toward specialization is to be condemned at least until after the hospital years; and during these hospital years it is the duty both of those in charge of out-patients and of those in charge of the wards to train the Resident Physicians most carefully in the diagnosis, prognosis and treatment of fractures. Too much reliance, in particular, should not be placed on the X-ray, in diagnosis and prognosis. That young doctor whom you see depending entirely upon a skiagraph in a doubtful case, may be a few months hence hundreds of miles from the nearest X-ray outfit and may have to depend upon his X-ray fingers in treating his patients. It is mere folly for anyone to state, as Lane has done, that it is a pure waste of time to teach students the classical signs for the diagnosis of fracture, since the only thing needed is a good skiagraph.

So, too, in regard to the operative treatment of recent fractures. It is generally recognized that this method cannot be applied successfully even by the average general surgeon; much less by the occasional operator or country practitioner. Indeed, the operative treatment of fractures deserves almost to be considered a specialty; it is difficult manual labor, requires extraordinary care in the preservation of asepsis, and necessitates a special armamentarium possessed by few general hospitals and by no general practitioners. No one who does much work in fractures fails to see every year one or more lamentable results due to operative treatment of recent fractures by the inexpert.

It is on all these accounts doubly incumbent on those who are responsible for the theoretical and practical instruction of medical students to so train them in what may be truly called conservative methods of treatment, that they will be able without resort to operation to cure their patients with the

*Read by invitation at a meeting of the Brooklyn Surgical Society, February 4, 1915.

minimum of disability. For a number of years I have been urging this very thing upon the profession: that non-operative treatment not only possesses the inestimable advantages of carrying out the sound surgical maxim "*primum non nocere*" but also may be employed by any sensible practitioner with a reasonable degree of success; and when employed with intelligence, thoroughness, and enthusiasm, in fractures almost of any type, and in long series of consecutive cases, will give as good as if not better results than will be secured by operation, done by the average surgeon, and without unnecessary risk to the patient.

Before discussing in detail the prevention and treatment of disabilities following fractures of the limbs, I may lay down certain theses, which will be developed in the sequel:

1. Lesions of the soft parts always accompany fractures of bone, but too often are ignored in treatment, and are a very frequent cause of disability.

2. In compound fractures lesions of the soft parts always should take precedence over those of the bones.

3. Active movements and functional use of the limb are the most important factors in overcoming disabilities due to lesions of the soft parts. Massage, especially *effleurage* and *petrissage*, is of much value in relieving edema, overcoming stiffness in neighboring joints, etc.; but passive movements usually are useless and often are harmful.

4. When the fracture occurs in the shaft of a long bone, it is not always possible (without open operation) to secure anatomical reduction of the fragments, and in most cases such reduction is unnecessary.

5. When the fracture occurs near a joint, it is indispensable to secure anatomical reduction and this should be obtained by open operation if necessary.

6. If operation is necessary this fact should be determined within a week or ten days of the accident, and operation should be performed before vicious union occurs or bone atrophy develops.

7. If operative treatment is required for old diaphyseal fractures, it is because of nonunion or because of concurrent lesions of the soft parts, and scarcely ever because of malunion of the bones.

8. Malunion rarely requires operative relief except when occurring in the immediate neighborhood of joints.

9. Nonunion is not always an indication for operation, and operation should be delayed until it is certain that cure will not take place without it.

(To be continued.)

FRACTURES IN THE NEIGHBORHOOD OF JOINTS.

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The practice of orthopedic surgery is limited to the consideration of chronic and progressive deformities. The orthopedic surgeon has no desire to treat the acute type of fractures, although he is eminently fitted by his mechanical training for the most successful treatment of these conditions; and his skill is further enhanced in this special field by the large experience gained in the treatment of vicious union, ununited fractures, and traumatic arthritis; therefore, fractures in the vicinity of the joints are usually referred to the orthopedic surgeon after from four to six weeks of unsuccessful treatment.

As demonstrated in the past, x-ray studies are especially useful in the recognition of injuries about the joints, but since the introduction of roentgenology, too much reliance has been placed upon it, at the expense of the clinical signs. These should, in every case, be studied most carefully and corroborated by the x-rays. The most important clinical symptoms are the existence of signs of mobility, the distribution of the discoloration, and the time of its appearance.

At times it is impossible to secure the x-ray examination immediately. In those instances, however, the clinical findings should always be confirmed as soon as possible. Thus, in mountainous or remote districts, for example, the practitioner, or consulting surgeon, may be compelled to arrive at the diagnosis of the condition solely on the clinical symptoms, and under such circumstances a thorough knowledge of the clinical signs is invaluable. This is also true even in some obscure cases, as upon one occasion, when I made a correct diagnosis of fracture of the lesser tuberosity of the humerus, from the position of the arm at the time of the accident, and the discoloration of the arm along the course of the biceps muscle.

The consideration of fractures in the vicinity of joints can be most intelligently studied under the following four appropriate headings:

1. Simple fractures.
 2. Compound fractures.
 3. Comminuted fractures.
 4. Fractures complicated with dislocation.
1. *Simple fracture in the vicinity of joints* should

not be difficult of recognition, if due attention be given to the physical signs and if these be confirmed by the x-rays. The greatest difficulty is in the treatment of these cases, particularly in holding the fragments in apposition. In the larger joints, as in the shoulder or hip, if the fracture occur below the insertion of the deltoid or psoas, the limb may often be placed in a position favorable for the maintenance of complete apposition; but where this is impossible of accomplishment, resort must be had to plaiting the bones, the employment of screws, ivory pegs, or the use of some kind of mechanical appliance. In fracture about the elbow joint, treatment has been greatly simplified by the employment of extreme flexion, first introduced to the profession by Jones, of Liverpool. In simple fracture about the knee joint, unless the fracture extend into the cavity of the joint, the maintenance of fixation is not very difficult if fixation and extension be combined. The fundamental rule is, that the joint should be kept in the best possible position for use, if ankylosis occurs; this fact should always be borne in mind. The elbow should be maintained in flexion and the knee in full extension, so that if ankylosis occurs, the member will remain a useful one. The principal exception to this rule is in fracture of the olecranon, which, for a time at least, must be treated in full extension. In simple fractures in the vicinity of joints, and especially where separation of continuity occurs, the early institution of massage and passive movements is invaluable.

It should be borne in mind that ankylosis of joints, as enunciated by Phelps, does not depend upon either motion or fixation, but upon the amount of disease or injury of the constituent parts of the articulation itself. In simple fracture involving the joint, sometimes a large fragment, as the anatomical head of the humerus, may be loose in the shoulder joint, or the head of the astragalus may lie loose in the ankle joint; these must be removed under the strictest aseptic conditions.

2. *Compound fractures in the vicinity of joints* are so frequently followed by infection that these are the most difficult cases to treat, but even in these, by patient care, the infection can sometimes be prevented by proper fixation of the joint, and the correct arrangement made for the dressings may oftentimes prevent the disastrous results. *Where the compound fracture is also comminuted* (3) the smaller fragments should be removed and the larger ones approximated with wire or plates and the limb placed in the best possible position for the occurrence of ankylosis. Suitable appliances and fracture splints are here invaluable, as the bracketed

wire splint of Packard, used formerly in excision of the knee joint, and the bracketed wire splint used by Esmarch in excision of the elbow joint, and which found extensive employment during the Franco-Prussian War. The last is forcibly illustrated in the case of a lad brought to me from the coal regions of Pennsylvania, who had sustained a compound comminuted infected elbow joint which surgeons wished to amputate. I performed a partial excision and then dressed the injury upon an Esmarch bracketed-elbow splint, resulting in a perfectly useful arm. In compound comminuted fractures of the shoulder hip, or ankle joint, a typ-



Fig. 1. Compound comminuted fracture of the elbow joint, treated by excision and Volkmann splint.

ical or atypical excision is usually the best possible surgical procedure. In compound fractures of the astragalus, the results are very often gratifying after excision of this bone—partial or complete—the malleoli completely adapting themselves to the new surface and giving a very satisfactory articulation; although recovery is accomplished with a very slight shortening of the limb.

4. *Fractures complicated with dislocation in the vicinity of joints.* These are the cases that most often seek relief from the orthopedic surgeon and each of these is a study in itself. The most common of these are so well known that they do not need detailed description, but special attention should be called to the shoulder, hip, and ankle joints, and, perhaps, to the elbow joint. Where the simple fracture is complicated with dislocation, the reduction should be made under an anesthetic as

promptly as possible, and the fracture should be held in apposition by means of plates, screws, or a mechanical device; then the greater part of the surgical treatment should be directed to the dislocation, especially to its maintenance and the prevention of ankylosis. In many of these cases there will be a rupture of the capsule, and this should engage the surgeon's attention if an operation is performed, since a recurrence of the dislocation is very prone to occur, if this important precaution be omitted. In some joints, as the ankle, an excision of the astragalus and a reduction of the dislocation give the best possible results. The time for this opera-

tion. If, therefore, the surgeon is unprepared to perform an *absolutely aseptic operation* he is unworthy of the task and should dismiss the matter from his mind; on the other hand, given an absolutely aseptic technic, there is no more danger in the opening of a joint than in the opening of the peritoneal cavity by the skilled surgeon.

The operating room and everything in connection with it must be as sterile as possible and everyone in the operating room must have the entire



Fig. 2. Compound comminuted fracture of the elbow joint, showing splint completed.



Fig. 3. Fracture of the astragalus with dislocation of the ankle joint.

tion will depend upon a number of factors, but if the patient's condition be good, it can be undertaken at once; but if it is not performed at that time, a certain period should elapse for the plugging of the vessels, the reduction of the swelling, etc., just the same as in operations for fracture of the patella, where a period of a week to ten days is allowed to elapse. Resection of the head of the radius gives excellent results, where there is limitation of flexion following fracture of the neck of the radius, with obstruction of supination or flexion.

Aseptic technic. In considering fractures in the vicinity of joints, one cannot too strongly emphasize the fact that there must be an absolutely aseptic technic. Surgeons have learned that the peritoneal cavity will tolerate errors of technic and will absolutely destroy infection, but no such beneficent provision exists in the articular cavities; and an error of technic in these regions too often means the development of septicemia and the death of the pa-

tient. head and face covered except the eyes. The patient should be separated from the anesthetist by a gauze screen. The hands of the surgeon, assistants, nurses, etc., should be thoroughly prepared by washing with soft soap for five minutes, then alcohol, then a solution of bichloride and finally sterile water; after which sterile gauze must be worn. No one connected with the case should have dressed a septic case for twenty-four hours previously, and if they have they need take special precautions. Joints should be washed with soft soap for three to five days before the operation, and be specially prepared three times within the twenty-four hours preceding the operation. This special preparation of the joint should be with soft soap, alcohol, bichloride, and sterile water, and then a dry dressing applied each time. If I have confidence in the previous preparation, I do not prepare the part at time of operation; but if there is the slightest doubt about its thoroughness, a final preparation is made

at the time of operation. The incision should be made through a piece of wet gauze and this can then be attached to the skin by clips. Long incisions should be avoided as much as possible on account of infection, and where possible, as in the knee joint, the tourniquet should be used to secure a bloodless field of operation.

I practically agree with Jones, of Liverpool, that the employment of passive movement as is so generally practiced is positively harmful as it disturbs the fragments of bones and leads to fresh plastic effusions, excess of callus formation, and increase of connective tissue about the articulation, all of which favor the development of increased stiffness. The oft-repeated to-and-fro movements only do so much damage, and no time is given for recovery before a fresh injury has been done. It is the part of wisdom never to move a joint, as long as union is likely to be disturbed. A joint should be put through each of its movements *but once*, and then left to recover from the damage. In one, two, or three days, each movement is again repeated, *but only once*. Passive movements thus applied are comparatively painless, and are not followed by any untoward reaction, which is always an indication for continued rest.

At the end of two weeks the part may be moved two or three inches and fixed in that position. Ten days later the position may again be changed to that of the first position; and not till the end of three weeks should passive movements be begun, and then but one movement in each direction—in the knee, flexion, and extension; in the elbow, supination, and pronation, partial extension and flexion. Nothing but good may be said for early and gentle massage, if skilfully applied and not combined with passive movements.

A METHOD OF FLUOROSCOPIC LOCALIZATION.

Say, for example, that the foreign body is in the arm. If possible the arm is moved till the foreign body presents itself at the highest point—that is, nearest to the surface. If the part cannot be moved the tube is moved to obtain this information. When this highest point is determined, a metal pointer is pressed gently over the part, and presently an area is discovered when on pressure the foreign body will move. This spot indicates the nearest route to the foreign substance, and the depth can be easily estimated, a pencil mark made on the skin, and the necessary data given to the surgeon. *HERSCHEL HARRIS* in the *British Medical Journal*.

INFECTED COMPOUND FRACTURE OF THE FEMUR INTO THE KNEE JOINT. TREATMENT BY CONSERVATIVE SURGERY.

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The following remarkable case illustrates the importance of conservative operative methods. It also shows what astonishing powers of recuperation are possessed by children. The feeble resistance of the child to shock and the quick recovery from the most extensive traumatism, once the initial shock is past, are phenomena which have often been brought to my notice.

On April 9, 1913, Annie B., a child of six, was admitted to Bellevue Hospital. Six weeks before she had sustained an open fracture of the femur into the left knee and for a time she had been treated in a hospital. The parents, however, ill-advisedly took her home and the case was frightfully neglected.

The condition of this patient on admission to the hospital was so wretched that it seemed that recovery were hardly possible. In addition to profuse suppuration in and about the left knee, complicating a fracture of the internal condyle of the femur, there was extensive pocketing down the leg and up the thigh. There were deep ulcerations upon both feet, especially on the dorsal surfaces, and a large bed-sore over the sacrum. The child was emaciated to the last degree and the eyes had the peculiar glazed appearance of a moribund person. The condition of the left knee in particular was so dreadful that the question of immediate amputation as a life-saving measure was seriously considered. However, I decided to make one attempt to save the limb, and at my request Dr. Edwin Beer performed the operation devised a number of years ago at the Mayo clinic.

This operation consists in severing, through an anterior transverse incision, all the soft tissues except a posterior flap in which run the main vessels and the nerve supply of the leg. The procedure affords in fact much the same advantage that might be derived from amputation and yet the member is left dangling by this important though narrow piece of tissue until the wide drainage thus obtained shall have relieved the sepsis. After this incision has been made the limb is put up at a right angle, the huge gaping wound into the knee joint presenting anteriorly and being treated by packing. All the recesses of the joint are thus fully exposed.

At this operation the loose internal condyle of the femur was removed. The photograph (Fig. 1) not only illustrates the appearance of the parts at the site of operation, but gives an impression of the general condition of the patient. Although it is hard to believe, yet the little girl had been in even a more deplorable state before the operation, the



Fig. 1.

picture having been taken about four weeks afterward. Note the ulceration of the leg and foot and also of the thigh—and the right foot was almost as bad as the left. (See Fig. 2 showing cicatrices.)

Very gradually the patient rallied, but it was not until May 22 that we felt justified in attempting to straighten the knee.

In general anesthesia I operated, removing more than an inch of the lower end of the femur in order to arrive at viable bone, and scraping away the granulations from the upper end of the tibia. Position was maintained with the aid of a molded plaster of Paris posterior splint. The discharge was profuse, necessitating many dressings; and six weeks later the prognosis as to the limb and even as to life itself was most doubtful. An annoying diarrhea set in to further complicate this terrible case.

With careful nursing through the summer and largely perhaps owing to the out-door treatment on the fire escape balcony, the patient gradually gained until by the middle of September she could hardly be recognized as the same shown in Fig. 1. There was naturally great shortening, but all the wounds except a small granulating spot had healed. There was some motion between the tibia and femur, but it was impossible to bring the bones into alignment, a flexion at about 160° having resulted.

The patient was sent home at the parents' request and remained there until winter, when she entered Mt. Sinai Hospital.

On December 15, 1913, in ether anesthesia, I made an incision through the anterior cicatrix between the bones and by forcible flexion exposed their ends. With the chisel about one-half inch was removed from the lower part of the femur, when it was found easy to place the parts in good position. Fixation was secured with plaster of Paris bandage. Perfect healing and good ankylosis then occurred and the child was discharged well on March 27, 1914, about a year after her original

injury. She walks with the aid of a steel extension piece.

In putting this case on record I feel it is but fair



Fig. 2.

to give full credit for the happy result to the generosity of Bellevue Hospital. For months this little girl was cared for by a special nurse and anything which it was in the power of the authorities to

grant was forthcoming. The members of the House Staff, too, deserve appreciation for the interest which they displayed and for the careful attention the case received at their hands.

48 EAST SEVENTY-FOURTH STREET.

THE ABDUCTION TREATMENT OF FRACTURE OF THE CLAVICLE.

JOHN J. MOORHEAD, M.D., F.A.C.S.,

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NEW YORK.

The vast majority of fractures of the clavicle make an excellent functional but a very poor anatomical recovery. This outcome is so uniform that surgeons at the first visit are quite ready to promise the patient a normally acting shoulder-joint, but a knobbed fracture site, and this last in some cases is marked enough to be called a deformity and in certain occupations may even lead to disability.

It is quite axiomatic that poor reduction of a fracture means large and often excessive callus, and in no instance is this precept more applicable than in the clavicle. The clavicle also exemplifies another fracture precept, namely, that bony deformity or imperfect union does not necessarily mean disability, as we know that the shoulder may act perfectly despite marked overlapping, excessive callus, shortening or fibrous union of the clavicle.

The essential reasons for poor alignment and the consequent deformity following this fracture may be said to depend upon (1) anatomical and (2) surgical grounds.

(1) *Anatomical grounds.* This "S" shaped bone supports no weights and lends no particular contour to the upper chest or outer shoulder, and indeed its only function is to act as a spinnaker boom support for muscles and ligaments. Of these muscles the action of those at the inner end (the sterno-mastoid and pectorals) is balanced by others at the outer end (the trapezius and deltoid), and when the bone is broken at the usual site near the middle, these muscles are no longer held opposingly taut and the outer end of the bone falls and with it the shoulder, and thus the characteristic deformity occurs with the inner two-thirds of the clavicle overlapping the outer one-third, which is also pulled forward and inward. This then produces a very marked anatomical deformity and unless the reconstruction is architecturally accurate, the site of trouble will for a long time and perhaps forever remain noticeable.

(2) *Surgical grounds.* These relate to our in-

ability to firmly hold the parts in place during the process of repair, even assuming that we have been wholly successful in our primary adjustment of them. The deformity due to the fracture (having always in mind the typical oblique cleavage about two and one-half inches from the acromial end) is a *downward, inward, and forward* tilting of the smaller fragment, and hence the indication for treatment is to lift this fragment *upward, outward, and backward*; or in short, when the bone is *down* and *in*, we must lift it *up* and *out*. To do this successfully we are often compelled to exert a great deal of force in elevating and pushing back the shoulder; and even assuming that we have been able to reduce the deformity and align the bone, it is often quite impossible to retain it by a safe and comfortable dressing. Stimson, nestor and authority of authorities, says that since the time of Hippocrates many sorts of retaining devices have been employed, but in the end all have been practically discarded except some sling arrangement like Mayor's, a Velpeau dressing, or the favorite of all, Sayre's adhesive plaster two-piece dressing. Stimson further says: "Displacement and shortening, however, are the rule; only those cases apparently are exempt in which the line of fracture is transverse and there is no displacement at first. The amount of the shortening may vary from a fraction of an inch to or even over two inches, and it may be produced by angular displacement or by overriding or by both" (6th edition, p. 207).

As stated, deformity over the fracture site, mal-union, or even non-union, may still coexist with a functionally active shoulder, and because of this, in the ordinary case, we make the reduction as perfect as possible and apply a comfortable dressing, knowing in advance that we will have some deformity but little or no disability if we do not keep the shoulder immobilized too long.

There are, however, some cases in which we strive to limit deformity either because our patient is a woman given to wearing a low-necked gown, or perhaps is a laborer who carries weights on his shoulder, and to whom a knob on the clavicle might prove disabling. In another group of comminuted, badly displaced fractures, or those associated with other injuries, it may be inadvisable to use the classical and accepted dressings, and it is for these somewhat exceptional cases that I wish to present what I have chosen to call the "Abduction Method" of treatment.

My attention was quite accidentally directed last April to the merits of this procedure during the treatment of a fracture of the upper third of the humerus in a chauffeur whose automobile collided

with a tree. The arm was placed in a position of right angled abduction and held thus by a plaster of Paris spica passing over the injured shoulder. Later I learned from the x-ray plates that the clavicle of the same side had been also broken, and that the position of abduction had almost completely aligned the collar bone even as it had the humerus.

Reflecting on this case, it at once became apparent that the essentials of treatment of fractured clavicle (namely, pushing the shoulder up and out) would be accomplished by abducting the arm to or beyond a right angle, and that further pulling back of the abducted arm would allow easy correction of overlapping. Since then I have tried this method in some few selected cases and apparently it acts very well in that group in which there is comminution or marked overlapping; or when deformity is likely to prove important from a social or occupational standpoint.

Application of the abduction dressing. The clothing is removed to the waist line and the patient is seated on a stool or low chair. An assistant stands behind the patient and elevates *both* arms to a right angle or beyond by grasping the elbows previously bent to a right angle. The elbows are then pulled further backward until overlapping or malalignment is corrected, the shoulder being still further elevated if required. This position gives easy control of the deformity because of the leverage on the shoulder obtained by grasping the bent elbows, and the abduction and retraction of the shoulder should be sufficiently active to *over-correct* the original deformity when possible. While the parts are thus held, a sheet-lint or flannel bandage is applied from the wrist to the affected shoulder and the latter is then bandaged spica-fashion, leaving the opposite arm entirely unbandaged. The prominences of the elbow are suitably protected by cotton and a pad of the same material is placed in the axilla, and then plaster of Paris bandages are used to retain the arm in this position of abduction.

Instead of having the patient seated during the abduction and retraction, the same manipulation may be practiced by allowing him to rest the head on one table and the remainder of the body from the waist down on another table, thus leaving free the shoulders and upper chest. I have found it useful to reinforce the plaster with strips of basswood to maintain the bend of the elbow and the elevated arm; sheet aluminum or other metallic strips would act equally well.

The part of the plaster spica over the fracture can be cut away, when desired, to permit inspection, and in some cases to prevent the penetration

of a bony spicule. The spica cast remains in position about three weeks, and if union is not then firm, the same cast or another is to be used as necessary. After removal of the cast, a sling is used for a week and thereafter no further support is usually required. If joint stiffness occurs, it is to be treated according to the standard methods.

In offering this procedure I recognize that it may seem needlessly irksome and painful to the patient; but as a matter of practice we know that an almost identical spica is uncomplainingly worn in many cases of fracture of the shaft or neck of the humerus. It may also appear over-elaborate and scarcely worth the trouble, but it certainly has a place in a selected type of case presenting the peculiar features already mentioned, and in general it is applicable in that group of cases in which plating or suturing might be advisable.

SOME MEDICO-LEGAL FEATURES OF FRACTURES.

WILLIAM H. MARCY, M.D.,
BUFFALO, N. Y.

There are several angles from which to look at this question: First, from the standpoint of the physician as applying to himself; second, from the standpoint of the susceptibility of the patient; and third, from the standpoint of the litigant.

FIRST. *As to the physician*, the law holds that in taking care of a fracture he must exercise reasonable care and prudence, and it requires only that care and prudence measured by the average skill of the physicians or surgeons in the community where he practices.

It is indeed prudent to have a radiograph of the fracture, even though it is of no aid in taking care of the case, for it provides a record and speaks for itself as to what the physician found and was treating.

But radiographs are so misleading, and make such a false impression on those inexperienced in radiography that, in my opinion, they should not be permitted to be viewed by a jury in any trial. To illustrate, a perfect recovery after a fracture as far as function and usefulness of the limb or joint is concerned may show in a radiograph the bones more or less out of alignment with large callus formation. On the other hand, one may have a comminuted fracture about a joint of such a nature that if set with all the bones in perfect alignment it would make a pretty x-ray exhibit, but would leave a stiff joint; whereas, sacrificing alignment for the sake of function, a man would get

a good recovery as far as function is concerned, and yet a radiogram of the joint would show such a deformity that if exhibited it would constitute sufficient grounds in a jury's mind to find a doctor guilty of malpractice, or to believe the defendant is suffering a permanent disability.

SECOND. *Susceptibility of the individual to fracture.* The fracture is often important from a medico-legal point of view. Fractures may result spontaneously, or they may be caused by falls or blows.

Illustrating the spontaneous fracture: I was called to see Miss R. a year or so ago. She had been riding a tandem motor-cycle when Dr. S. approached in an automobile with the lamps on his car unlighted and, according to the doctor's story, the girl jumped off without being hit and without falling, but she sustained a fracture of the left tibia. When I saw the case the leg was swollen, there was distinct crepitation, no ecchymosis, and no pain. I diagnosed a Charcot's fracture. I insisted upon her removing her clothing and found her other leg covered with syphilitic ulcers. This cleared up what might have been a very unpleasant case for the doctor.

The bones of the aged are more brittle than at any other time of life, hence it is not uncommon for old people to fractures from violence that would not cause severe injury in adult life. The bones of the very young are not as fragile as those of the aged, but they are more fragile than those of the adult, for it is in middle life that the bones reach their maximum solidity and firmness. Certain diseases, rickets, syphilis, and others, render the bones more fragile, and there is a peculiar condition which is characterized by excessive brittleness of the bones and which appears to be more or less hereditary. This brittleness may lead to fracture from a violence that would not affect a normal bone. In these cases it is almost impossible to determine the actual amount of violence used and one can demonstrate the brittleness only by post-mortem.

A medical witness may be asked to determine whether a fracture was produced before or after death. If the fracture occurred some time before death, there will be effusion of blood into the tissues and other evidence of laceration of the muscles, and there may be signs of inflammation. Fractures occurring shortly before death and those occurring immediately after death, while the body is still warm, present similar characteristics.

Fractures occurring a considerable time after death are unattended by any large amount of blood effusion and are, as a rule, of no difficulty to the medical witness. If a person received a fracture only a short time before death there may be no appreciable evidence that he lived after the fracture was sustained, or that the fracture might not

have been caused after death. If there is evidence of some effort of nature to repair the injured bone in the way of pouring out of blood or the beginning of callus formation, the injury was clearly not post-mortem.

In childhood, bones unite rapidly, and late in life, very slowly; occasionally when a person is not in good physical condition repair may be very much delayed; and, rarely, one meets a fracture that will not mend at all.

Fractures may occur as the result of moderate muscular exercise and the parts most apt to suffer are the tips of the elbow, patella, heel, and occasionally the upper arm, as in throwing a ball. Sometimes a rib fractures in violent coughing. Many fractures of the femur have occurred from simple muscular work where no particular violence was exerted. In fractures of this nature there is no bruise of the skin, nor any appearance that violence had been inflicted. The presence of ecchymosis removes any question as to the spontaneous fracture of bones.

THIRD. *The litigant.* Occasionally a question arises as to whether a person has ever had a fracture. Such questions arise when persons sue for damages long after an accident, and the same question arises in recent accidents where the x-ray readings are falsely interpreted.

As a rule, in the old cases, the place of fracture can be determined by a slight projection or thickening of the bone where union has taken place, and often the alignment of the bones of the limb is not normal. It is impossible to say in these cases how long previously the fracture took place where there is nothing but the ossified callus at our disposal.

What I want to lay especial stress upon is fracture and deformity as interpreted by the x-ray in cases in litigation by physicians who have not had a wide experience in x-ray work. In such cases there may be pointed out to a jury, or gotten into the records that a certain fracture or deformity exists when in reality no fracture or deformity is present. Consider, for example, an individual with a saddle back. Take an antero-posterior radiograph and there will be on the plate what appears to be the bodies of some of the vertebræ separated more than the others, the spinous processes being brought closer together than anteriorly—which could be interpreted, off-hand, by some physicians, as a compressed fracture of the spine with no cord symptoms.

Flex the legs of the same individual, bringing his knees up, raise his shoulders and take the arch out of his back, and bring the curve of his back

down on the plate and the x-ray picture then will show that the spaces are equal, and the bodies are equal, and that what was interpreted in the other plate as a compression fracture, did not exist.

In a radiograph of a normal spine with gas in the bowel in front of the vertebrae, one notes a hazy effect on the plate about the vertebrae that might be interpreted as a spondylitis; in a radiograph of the same spine under different conditions and at different times this hazy effect is all cleared up and the picture is a normal one.

Occupational effects on the spine are at times misleading, e. g., in a blacksmith the bodies on one side are narrower, with increased density.

Where the deep psoas muscle crosses the transverse process of the vertebrae it often leaves a line that is interpreted as a fracture of the transverse process. Likewise, in a large individual the crease or fold at the groin may throw a line on the plate across the vertebrae that will be read as a fracture. But when a transverse process is fractured it is always out of alignment on account of muscle pull.

Where the intercostal groove in the rib runs up to the facet it makes a line that looks like a fracture, but in almost all rib fractures there is callus, and the distal end is out of alignment. Again, one often finds that ossification in the costal cartilages that produces an irregularity in the picture that is sometimes mistaken for a fracture.

In the skull the meningeal blood vessel grooves are all too often interpreted as fractures.

In an antero-posterior radiograph of the hip there is often foreshortening of the neck of the femur and some might interpret this as an impacted fracture of the neck, judging by the radiograph; a radiograph made with the rays striking at right angles will show there is no shortening of the neck of the femur.

Quite similarly a radiograph of the foot, taken antero-posteriorly, can produce a picture showing the tarsal bones separated on the big-toe side, and crowded together toward the little toe. I have often seen this described as a deformity due to injury.

About two years ago Dr. Goldthwaite read a paper in Buffalo touching particularly upon injury to the sacro-iliac joint. Following his visit to Buffalo it was my privilege to be called into no less than twelve consecutive cases that were in litigation, the plaintiff claiming to be suffering from a separation of the sacro-iliac joint due to trauma.

The first case was that of Miss M., who had been in a head-on collision of cars. It was claimed she suffered a large hematoma and discoloration over the sacrum, a separation of the sacro-iliac joint,

and hemorrhage into the cord, and that she had been bed-ridden for two years. The case was presented to me by the defense, who claimed they had sixty witnesses who would swear that the girl was not hit or injured in the back; but the defense was confronted by the fact that the girl had a large discoloration over the sacrum and a radiograph showed a sacro-iliac joint separation. With the history of the defense that the girl received no injury over the sacrum, I suggested that the discoloration might be the blue edema of hysteria, called by some the angio-neurotic edema of hysteria; and that the separation of the sacro-iliac joint might be an "illusion picture" taken of the joint at an angle.

As the plaintiff would settle only for a very large sum out of all reason, a jury was procured and the case proceeded to trial.

The trial was a very spectacular one. The patient was brought into court on a stretcher, and besides the regular hospital attendants, she was escorted by a fan brigade, an ammonia brigade and a hypodermic brigade. She was taken to the witness stand on a wheeled cot. But one question was asked her, viz., "What is your name?" She immediately went into a faint and all the brigades "got busy" with their specialty, and after a demonstration of from ten to fifteen minutes before the jury, without arousing the patient, they all filed out of court as they had come in with the patient. It was arranged that the plaintiff's deposition should be taken at her home and I was appointed by the Court to be present.

At home she answered questions freely, and during her cross-examination the most typical black and blue mark appeared upon her face and remained there about one-half hour before it disappeared.

The plaintiff's physicians evidently did not know the theory upon which the defendant proceeded, and their six or eight doctors varied in their description of the black and blue area; but the plaintiff's attorney, from the testimony of the last witness, who was a sister, suspected our theory, as she seemed to be able to describe the black and blue area as most typical of that found after trauma; she evidently wished to make a good witness for the plaintiff, and upon being asked by the defense how long the black and blue area had remained after the accident, she replied "one year."

We also procured half a dozen normal cases of about the same build as the plaintiff and took radiographs of the sacro-iliac joint by tipping the pelvis and taking it at an angle, and we had plates that appeared almost identical with that of the plaintiff. These plates were presented to the jury, also the theory of blue edema of hysteria as explaining the discoloration over the sacrum, and I might say these exhibits had something to do with the plaintiff receiving nothing at the hands of the jury.

Another case I might relate of so-called separation of the sacro-iliac joint with rarefaction of the bone or softening close to the joint; this was a normal joint, but a cathartic had not cleared out an accumulation in the bowel that reflected on the plate, and the joint was radiographed at an angle.

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WALTER M. BRICKNER, M.D., Editor

NEW YORK, MARCH, 1915.

OUR DECENNIAL.

With this issue the AMERICAN JOURNAL OF SURGERY completes ten years of publication under its present editorial direction, literary and managerial. In this decade THE JOURNAL has steadily developed in circulation, in influence, in the value of its contributed articles.

The plan of THE JOURNAL, formulated in 1905, has been modified only by the addition, several years ago, of the unique Department of Surgical Sociology, which has been conducted by Dr. Ira S. Wile, whose accomplishments in social medicine are well known. We believe that this original and stimulating department has been enjoyed by our readers. At any rate, like Surgical Suggestions, it has been widely quoted. A feature, but lately added, is the Quarterly Supplement of Anesthesia and Analgesia, edited by Dr. F. Hoeffler McMechan, in which our readers will find all that is best and most modern in this branch of surgery.

The other associate editors and the assistant editor, Dr. Erwin Reissman, have also been connected with THE JOURNAL for a long time, and all have served it faithfully. Of these, Dr. Eli Moschcowitz has been on THE JOURNAL staff throughout the ten years. A trained pathologist and a thoughtful clinician, broad-visioned in medicine and broad in all the interests that make for culture, he has brought his intellectual qualities, his medical foresight and critique to the loyal and enthusiastic support of THE JOURNAL in various editorial departments.

In addition to the many shorter contributions, THE JOURNAL has published several serial articles on practical surgical subjects that have subsequently been printed in book form. In addition to One Thousand Surgical Suggestions, reprinted from an editorial column, these books have been: Paraffin in Surgery, by Wm. H. Lockett and Franz Horn; Plaster of Paris and How to Use It, by Martin W. Ware; Blood Examinations in Surgical Diagnosis, by Ira S. Wile; Practical Points in Anesthesia, and Guiding Principles in Surgical Practice, by Frederick-Emil Neef; Surgical Operations with Local Anesthesia, by Arthur E. Hertzler; and Diseases of the Bones and Joints, by Leonard W. Ely. Richard Hall Johnston's interesting articles on Straight Direct Laryngo-, Broncho- and Esophagoscopy have recently been completed.

In our "Salutatory" in 1905, we said: "It is the intention of the editor to conduct a high class journal of practical surgery. . . . Beyond that aim he has no 'editorial policy' to announce—no foibles to foist, no quarrels to pursue." On this, our tenth birthday, we repeat these peaceful declarations.—W. M. B.

FRACTURES.

Until the birth of asepsis made possible the development of abdominal (and, later, thoracic and intracranial) operations, surgery concerned itself chiefly with the extremities. Now that the pathology of most surgical visceral lesions has been learned and their treatment fairly standardized, surgical thought, seeking new realms to conquer, reverts to the still undeveloped field that concerns the bones and joints—whose pathology and repair still present so many problems of which we have but scratched the surface. Touching on almost every aspect of these problems is the treatment of fractures in its various phases—reduction, restoration of function, non-union, repair. So thoroughly are these considerations based on the physiology and pathology of the skeletal structures, that the study of fractures must, of necessity, be a fundamental part of the surgical investigation into the management of the affections of these tissues in general.

The economic aspect of fractures has been demanding increasing attention. It has, indeed, compelled a study of our fracture results from a new viewpoint—their measurement in broad terms of restored economic efficiency. Wile's statistical presentation in our last "fracture number," and the data published by Walker in THE JOURNAL, De-

ember, 1914, fragmentary though they are, afford some inkling of the heavy burden upon the community at large, upon industrial workers in particular, that is imposed by loss of function after fractures; while Cotton's article in this issue of THE JOURNAL reminds us that we have not gathered sufficient data concerning ultimate results in that particularly crippling and hard-to-manage injury, fracture of the neck of the femur.

In recent years the efforts to secure adequate reduction and fixation have evolved traction apparatus such as those of Lemon and Downey, semi-operative traction methods (Steinmann, Codivilla), and various operative procedures—by the employment of external clamps and screws (Lambret, Lambotte Hachenbruch, Lilienthal), and by concealed plates and bone splints (Lane, Albee, Murphy).

Of the operative methods of fixation, Lane's has had the widest trial. It is still having "its day in court," and there are indications that the final verdict will not be altogether favorable. The number of cases, operated upon by good surgeons, in which the metal plate has caused trouble and had to be removed, is altogether too large. In his latest article, published in this issue of THE JOURNAL, Lane repeats that this is always the fault of the operator. Perhaps this is true, but we incline to the belief that the blame must also be borne in part by the physiology of the tissues.

In what percentage of cases operated upon by men who have competently followed Lane's technic throughout have the plates maintained fixation, secured union, and remained unirritatingly *in situ*? Moreover, if experienced surgeons generally have failed to master Lane's technical details, is his method an acceptable one for so common and widespread a condition as fractures?

Various men have observed that the use of Lane's plates *delays* union. We pointed out last year that metal plates and screws thus applied to the bone can, independent of other factors, *prevent* union. The non-employment of a plaster cast and the early assumption of active and passive movements and massage no doubt help bone formation, but the failure to follow this post-operative plan will not lift from the Lane plate the great objection that it is an inhibitor of osteogenesis. Its employment is therefore unphysiological and should, we believe, be limited to those cases in which less rigid splinting cannot be relied upon. In all other cases we would prefer the inlaid bone-graft-splint, or the simple non-splinting bone graft, both of which operate on, and not in defiance of, physiological principles—W. M. B.

LETTER TO EDITOR.

LONDON, ENGL., January 15, 1915.

Editor, AMERICAN JOURNAL OF SURGERY:

In your editorial on Association in October issue you are sceptical concerning Professor Crile's explanation of post-operative pneumonia. May I point out that it was shown by Dr. William Pasteur, physician to the Middlesex Hospital, in an oration published in the (London) *Lancet*, May 20, 1911, that post-operative pulmonary complications are to a great extent due to inhibition of the diaphragm following operations in its region—this leading to massive pulmonary collapse, a condition that may go on to broncho-pneumonia if infective material be present. Hence the site of operation is a very important factor. Of course, one must not forget other predisposing and exciting causes, such as previous disease, overtight bandages, etc., but these are probably far less important than was formerly supposed.

In *The Lancet*, October 25, 1913, I suggested that reflex inhibition of the diaphragm may also partly account for the nausea, flatulence and vomiting which are so much more common after operations on the kidney than after those on some other abdominal organs, especially the uterus.

Yours faithfully,

J. D. MORTIMER, M.B., F.R.C.S.

Surgical Suggestions

Wire sutures are unnecessary and undesirable in operating upon the fractured patella or olecranon. Kangaroo tendon, which is slowly absorbed, is strong enough.

After injury to an extremity localized tenderness or extensive ecchymosis is each sufficiently suggestive of a fracture to make an x-ray examination desirable, even though all other signs are absent.

In cases of fracture of the base of the skull, operation is not indicated unless the cerebral symptoms are persistent or progressive.

A "pathological fracture" is usually due to a bone tumor (sarcoma, carcinoma, myeloma), cyst or gumma. An expert interpretation of a radiograph will best serve to distinguish these. The Wassermann reaction; it must be remembered, is sometimes negative in tertiary syphilis.

It is worth remembering that abduction is of great value in the prevention and in the treatment of stiffness of the shoulder after trauma.

Surgical Sociology

Ira S. Wile, M. D., Department Editor.

SOME SOCIAL PHASES OF FRACTURES.

Within the domain of surgery, few conditions involve greater responsibilities for the surgeon than fractures. Prognosis is involved with greater difficulty than in most conditions requiring surgical treatment. From the standpoint of social results, fractures involve greater hazards than amputations. As a result of fracture the various tissues of the limb are so injured as to render the problem of earning a living by muscular labor a serious one.

The expansion of systems of workmen's compensation makes an understanding of the hazards of fractures a pertinent subject for investigation. The question of the liability of fracture in occupation is heightened among workers suffering from some specific disease or among those who, because of underfeeding, are much below par. The predisposing causes influencing fracture may not be of immense importance in connection with compensation itself, but it is certainly true that insofar as employers' liability is concerned, previous disease of the bones should be considered in connection with the after-effects of a fracture. The association of sarcoma, previous osteomyelitis, and osteomalacia afford excellent examples wherein technical difficulties may arise in connection with the determination of compensation for fractures among industrial workers.

With all varieties of fractures, the particular difficulty lies in foretelling the state of union which may be secured. The processes of healing in bones are slow in action; and permanent and sound union of fragments may not occur until several months after the injury. The more severe the labor of the worker, the greater the delay before he is physically fit to return to his occupation. What represents sound union for one individual is not necessarily adequate for another. It is not possible to lay down a rule as to when a victim of a fracture of the arm, for example, should be able to return to his occupation. Each fracture case must be judged on its merits. Even though artificial means, such as wiring and plating, are employed, it is a serious matter to determine when it is absolutely safe for the resumption of strenuous employment. Non-union fractures, delayed union, mal-union, complicate the social difficulties resulting from fractures.

The economic losses incident to fractures are not merely the wage loss because of inability to be at work. The thrifty and financially able voluntarily assume the burden of accident insurance in order to protect themselves from economic losses due to injury. The purpose of this insurance, however, is to prevent the occurrence of the social losses that might accrue where there is no money available.

It is unfortunate to state that fractures among the poor increase their poverty. It is incontrovertible that the individual temporarily disabled by a fracture is an economic burden upon the household, a food consumer, a virtual source of increased eco-

nomie distress because of the care which must be lavished upon him. The expenditures for hospital service, radiographs, and dressings form a severe tax upon the slender savings, if any exist, and tend to lower the vitality of members of the household because of their deprivation from the ordinary food and clothing which they otherwise would be able to secure. In fact, for the time being the injured victim is a greater drain upon the family than he would be if suddenly killed.

The difficulties of estimating the degree of disability have long been recognized. In Denmark, however, the principle of grading degrees of impairment in accident cases obtains, and total disability is paid for in terms of the degree of impairment that resulted from the accident. From the report of 1906, in all their accident cases only 15.6 per cent. presented more than 25 per cent. of total disability. Inasmuch as this return covered industrial accidents of all types, it is fair to assume for the moment that similar figures may apply with reference to the degrees of impairment in fracture cases. To grant that 25 per cent. of total disability may result from a fracture may mean that the patient is obliged to change his occupation, accept a lower wage or actually be thrown among the unemployed or unemployable.

There is another phase of fractures which is also of serious importance. Regardless of the fact that the social responsibility upon a surgeon is more weighty in the case of fractures than among many other conditions, the rate of compensation for surgeons for attendance upon patients suffering with fractures has not been carefully defined in many of the workmen's compensation acts. For example, in the fee bill of the New York State Workmen's Compensation Commission, which has been approved by the Medical Society of the State of New York, we find that the rate for the treatment of a fracture of the femur is twenty dollars, while amputation of a finger or toe is compensated at the rate of fifteen dollars. The treatment of a fracture of the spine, with all its responsibilities, is compensated at the rate of thirty dollars, while tracheotomy is to be compensated at the rate of forty dollars. The principal distinction made in the compensation rate is that compound fractures shall receive 25 per cent. extra, while operations for wiring and plating of bones shall be compensated with 50 per cent. extra.

As a whole, the fee bill is excellent, though the fees do not indicate any particular relation to the responsibilities of the surgeon nor indeed to the social significance of the injuries for which compensation is made. Fractures of the forearm or upper arm extending into the elbow, even though not compound, are more serious than many other types of fractures and special rate of compensation for a fracture of this type would be entirely within the bounds of logic and reason.

It is not fair, however, to criticize at this time the compensation rates as laid down by the New York law. They have been approved by the Medical Society of the state, which it is fair to presume

carefully considered the economic aspects of the problem insofar as it relates to the surgeons. The workmen's compensation law itself gives careful consideration to the social needs of the workers and it is fair to assume that under the workings of the new enactment, fracture cases will be properly cared for from the standpoint of the surgeon, the patient, the family, and the community. It is to be hoped, however, that in future reports, the arrangements of statistics will be such as to give us a wider knowledge regarding the relation of fractures to social efficiency as well as to its economic cost to the state.

Progress in Surgery

A Résumé of Recent Literature.

Modern Bone and Joint Surgery. ASTLEY P. C. ASH-HURST, Philadelphia. *New York Medical Journal*, January 30, 1915.

The perfection of asepsis has changed greatly the present treatment of fractures and of ankylosis and made possible modern methods of bone transplantation.

The interest in the treatment of fractures has been quickened largely by the wide usefulness of the x-rays. With their aid better anatomical diagnosis is possible and better and more accurate reduction, though accurate anatomical reduction of a fracture in the shaft of a long bone, for instance, is not always necessary to secure perfect functional recovery. Such a result is, however, desirable in fractures of the lower extremity where displacement and shortening are not so readily compensated for as in the arm or forearm; in fractures near joints accurate reduction is imperative. Reduction frequently is accomplished by manipulation; when required, open operation should be performed. In old fractures resection of the fractured bones with plating may be called for.

For the treatment of ankylosis the old classic procedure of excision is often replaced by arthroplasty, i. e., interposition of fat or fascia flaps. This allows much greater stability at the elbow and shoulder and even a fair amount of mobility at the hip and knee. The function of the knee after arthroplasty is of striking value, especially when compared with the rigidity following excision. Arthroplasty is, however, a difficult operation and not always a successful one.

Bone transplantation finds its greatest indication in ununited fractures. It is used to fix the spine in vertebral tuberculosis, and after excision of a bone tumor, inserting a transplant may be the only method to maintain the form and function of a limb.

In addition, modern surgery offers arthrotomy and reefing of the capsule for irreducible dislocations, excision of the diaphysis for osteomyelitis and orthodesis—ankylosis for paralytic flail joints.

The Use of Indirect or External Fixation in the Open Treatment of Fractures. E. P. QUAIN, Bismarck, S. D. *The Journal-Lancet*, January 1, 1915.

The author contrasts the use of bone-plates with that of external fixation in the open treatment of fractures and believes that the latter is the method usually to be preferred. He says: "The purpose of this paper is not to condemn bone-plating when sufficiently indicated and properly performed, but, rather, to dignify it, and to extol it to the highest plane in surgery, where it should be approached only by the cleanest of hands, conscience and specialization." He quotes the work of Groves, Lambotte and Freeman, all of whom advise various types of apparatus which indirectly hold the fractured bones in apposition. After reduction the author advises small incisions about two inches from the fracture, blunt dissection down to the bone, insertion of a screw into each fragment, and

the maintenance of apposition by external clamps. The screws are left in place from two to five weeks.

The method is comparatively easy and rapidly applied, permitting a surgeon of good operative judgment and technic, but lacking extensive experience in bone surgery, to operate with reasonable safety and success and with a minimum destruction of bone elements. The fixation is firm and permits early movement of neighboring joints. There is no metal in contact with the fracture line. The screws are entirely removable, leaving no foreign body behind. In compound fractures it holds the fragments in place, aids drainage, and makes dressings convenient and painless.

Transplantation of Bone in Ununited Fractures. M. S. HENDERSON, Rochester, Minn. *The Journal-Lancet*, December 1, 1914.

A consideration of 32 cases of delayed union in the long bones, treated by means of bone transplantation, shows that the method is an excellent one. In only five cases were the results unsuccessful, the remaining twenty-seven doing extremely well. Transplantation of bone is preferable to the metal plate in treatment of cases of non-union, with the probable exception of the femur. Clinical and radiographic studies tend to show that the hard cortical bone used as an intramedullary plug is slowly absorbed, and does not persist as a permanent splint. In its absorption it promotes osteogenesis. Absolute fixation is to be maintained, particularly in the humerus, where a transplant is used. The inlay method is the method of choice where possible, for by it an anatomical approximation of tissues is allowed—periosteum to periosteum, cortex to cortex, medulla to medulla. Hard bone placed in the spongy bones in the epiphyses is gradually absorbed to be replaced by bone normal to that area.

Fractures of the Neck of the Femur: Its Treatment. JOHN B. WALKER, New York. *The New York State Medical Journal*, December, 1914.

A careful study of 112 cases of fracture of the neck of the femur leads Walker to the following conclusions:

1. Fracture of the neck of the femur occurs under fifty years of age more frequently than was formerly believed.
2. Any injury to the hip followed by disability should suggest the possibility of a fracture of the neck, and requires an expert examination aided by an x-ray photograph.
3. Reduction of the deformity with complete immobilization of the fracture during the period of repair by means of a plaster spica bandage is advised in all suitable cases.
4. This is to be followed by early gymnastic movements, active rather than passive.
5. All weight-bearing upon the fracture is to be avoided for from four to six months; in some cases even longer.

Fracture of the Elbow in Childhood. WILLIAM FRANCIS CAMPBELL, Brooklyn. *The Medical Times*, February, 1915.

In the fracture of a long bone a slight discrepancy of the fragments is compatible with perfect functional result. But in fracture of the elbow even slight abnormal prominence in the interior of the joint will be an obstacle to normal joint movements, and may be the cause of permanent disability.

It is obvious that reduction here is something more than the reposition of fragments; it implies a coaptation so accurate and a retention so complete that the resulting joint surfaces will permit of normal joint movements.

If the fragments be accurately reduced and held in this position the question of duration of immobilization and the special position in which the limb should be placed are secondary considerations.

The fundamental fact must be appreciated that it is not the duration of the immobilization that produces ankylosis, it is the faulty reduction causing periosteal proliferation that locks the joint; and further, *no special position of the arm will obviate the disastrous results of an incom-*

plete reduction. The general rule to be followed in all cases of fractured elbow is—accurate reduction maintained by that splint and that position of the arm which is best suited to the special indications of the individual case.

Each fracture is a special problem, with its individual needs and its peculiar indications; and while no precise rules can be formulated, certain precepts may be followed which will be a safe guide in all cases.

Find out exactly just what is fractured and be satisfied with nothing but anatomical accuracy.

A clinical examination under anesthesia is the first requisite; but it is never sufficient; it must be supplemented by an x-ray examination. Two radiographs should be made, one profile, and one surface view. *The x-ray picture without proper interpretation is futile.*

Reduce the fracture by such maneuvers as are efficient in accurately coapting the fragments (flexion, extension, traction, direct pressure, etc.). Care should be taken to avoid any rough manipulations.

Immobilize permanently only when assured that reduction has been obtained, and that the position of the arm and the splint selected are adequate to maintain reduction.

This will be evidenced by (a) normal conformation of the parts; (b) a normal range of flexion and extension. But best of all is confirmation furnished by a second radiograph.

Osteitis Fibrosa with Report of a Case. JAMES VAN ZWALUWENBURG, Ann Arbor, Mich. *The Journal of the Michigan State Medical Society*, January, 1915.

The author describes a boy, 14 years old, complaining of deep-seated pain in the hips. With this there developed a peculiar waddling gait and a deformity causing a forward and outward bending of the femora and an apparent shortening. The boy met with an accident, supposed to be a fracture, and the x-rays thereupon taken were interpreted as those of a case of osteitis fibrosa.

The radiograms revealed sharply circumscribed areas of diminished opacity usually longitudinally striated, but without involvement of the periosteum or the formation of distinct bony shells about them. The diaphyses of the long bones of the lower extremity are the sites of election.

From inflammatory diseases of bone, viz.: osteomyelitis, tuberculosis and syphilis, it is distinguished by the absence of any evidence of secondary reaction in the neighboring tissue. From rickets it is distinguished by the absence of the characteristic changes in the epiphyses. Multiple metastatic sarcoma may give very similar pictures, but the striations are absent. Sarcomata rarely occur as multiple lesions, show an early tendency toward rupture through the bony cortex, and frequently show bony spicules as slender striations radially arranged from the point of primary growth.

To the uninitiated the condition presents many difficulties, and many cases have been subjected to curettage under the suspicion of an osteomyelitis or have undergone amputation for sarcoma.

Mechanical Treatment of Compound and Suppurating Fractures Occurring at the Seat of War. R. JONES, Liverpool. *British Medical Journal*, January 16, 1915.

Jones believes that operative methods are out of the question in gunshot fractures. He also decries the use of plaster of Paris. It mops up discharges like blotting paper, becomes very offensive and adds to the already existing infection. The author describes in detail his methods for the most common forms of fractures. He is very partial to mechanical splints of various kinds. For the femur he advocates a modification of the old Thomas splint. Fractures of the humerus, however, require no splints. The elbow is merely slung at right angles and fixed by a broad bandage to the side. Where ankylosis is expected after a bad smash and suppuration of the shoulder, the arm should be kept abducted slightly forward and slightly rotated inwards. Jones warns against the removal of loose pieces of bone through the wound. If quite loose they can be taken out, cleaned, and replaced. Even in the presence of pus they may unite.

Complete Fracture of the Lower Third of the Radius in Childhood, with Greenstick Fracture of the Ulna. PENN G. SKILLERN, JR., Philadelphia. *Annals of Surgery*, February, 1915.

Skillern states that in childhood a complete fracture of the radius with incomplete greenstick fracture of the ulna in the lower thirds of their shaft represents as distinct a variety of fracture involving both bones as is present in the mechanism and characteristics of the better known and differentiated entity, Colles' fracture. The cause of this newly described type of fracture is quite constantly a fall while in motion, off of skates or a bicycle. In the resulting deformity the lower fragment of the radius is displaced to the dorsum and laterally, the ulna is bent with its concavity toward the radius, the radial portion of the fibers of the ulna at the site of fracture are compressed, not torn asunder, while the inner fibers are only separated.

From a study of cases the author demonstrates that it is the intact outer fibers of the ulna, which serve to maintain the position of both bones after the trauma has already broken the inner ulnar fibers. These outer fibers, therefore, maintain the deformity of vicious bowing of the ulna. Accordingly, the ulna greenstick fracture is converted into a complete fracture, the inner border of the ulna thereupon permits of alignment, while the radial fragments reduce themselves spontaneously with a little pressure.

The Prognosis and Conservative Treatment of Fractures, Notably End-Results. W. P. CARR, Washington, D. C. *The Virginia Medical Semi-Monthly*, January 22, 1915.

Carr believes that practically all fractures of the femur may be successfully treated by extension with weight and pulley. The weight must be sufficient to overcome all shortening, and must be applied within eight hours after the fracture, thus sparing the patient much needless pain from the muscular contraction; furthermore, it must pull in the right direction to keep the bone in alignment. He advises the use of good quality adhesive plaster neatly applied from the point of fracture down to the ankle and joined to a board to which the cord of the weight is attached. Two cautions must be observed: the heel must not be pressed downward to the mattress, and the board must not be allowed to become embedded in the folds of the bedclothes. To prevent the patient from slipping down in bed, a number of devices are available: passing bandages under the arms and fastening them to the head of the bed; having an inclined plane of boards under the mattress so as to get it to an angle of 30°; the same result can be accomplished by having a bed with a hinge in the middle. A small pillow under the knee will prevent painful sagging. The pain attendant on the application of the pulley should be relieved by a full dose of morphia.

Although it is difficult to overcome shortening if the patient is not seen until thirty-six hours after the fracture, it can sometimes be done on a fracture extension table, under an anesthetic.

In a transverse fracture, the rough ends of the fragments may be brought end to end, and made to interlock without open operation. Then the plaster cast may be applied from the toes to above the waist. Carr advocates the use of the weight and pulley for two or three weeks, and then uses a plaster cast, from the toes to the nipple.

Most fractures of the humerus may be treated without open operation by first putting a plaster jacket around the chest and both shoulders, then around the forearm and elbow with the elbow at right angles and the thumb pointing upward. After the hardening, reduce the fracture by extension and manual manipulation with the arm at right angles to the body. Still holding the arm at a wide angle to the body, fill in the gap between the plaster cast on the forearm and that around the shoulders. When this latter hardens, extension against the flexed forearm and counter-extension against the thoracic jacket will prevent all shortening and displacement.

The only cases of fracture in which he considers operation advisable are those of the patella, olecranon, some comminuted fractures about elbow and knee, fractures at the anatomical neck of the humerus, and in cases where fragments have been caught under the muscles.

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A REVIEW OF 114 CONSECUTIVE OPERATIONS FOR ACUTE APPENDICITIS, WITHOUT MORTALITY.*

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The following report is based upon 114 consecutive cases operated upon by me at the Buffalo General, Children's and Erie County Hospitals and in private homes (13 cases). The cases were all acute; no interval or chronic cases being included in this report, as, of course, such cases should have no mortality. This series embraces all types of the acute disease and includes several of considerable interest.

I have grouped them under the headings of "catarrhal," suppurative, gangrenous, and perforative appendicitis, the latter consisting of those cases in which the gangrenous or suppurative type had ruptured. Of the catarrhal type there were 57, of the suppurative 48, of the gangrenous 9, of the perforative 35.

It has been of interest to note how few of the cases have shown the position of the appendix to be that usually displayed in text-books as normal. Nearly all showed either a posterior position with regard to the caput cecum, varying from implanation in the retro-cecal fossa to the true retro-cecal type lying both retro-cecal and extraperitoneal; or a short and distorted meso-appendix causing kinking or constriction of the appendix. This leads me to believe that anatomical peculiarities causing an interference with the lumen of the appendix must be an etiological factor of considerable importance in the disease. Lane's kink and the various pericolic membranes which we have noticed occasionally causing symptoms in chronic cases have been noted but a few times in this series, for the acute inflammation present has in the majority of cases forbidden manipulations more extensive than those necessary to meet the immediate indication.

There were in this series three cases in which the first symptom, pain, was evidently coincident with perforation of the appendix and the beginning of

peritonitis. One was a man whose first symptom was sudden and severe pain in the right lower quadrant which seized him about 10.30 A.M. I saw him at 3 P.M., operated at once, and found a perforation in the tip of the appendix and free pus. The other two were operated upon eight and ten hours, respectively, after the sudden pain. In both these cases there was a large amount of pus and in neither case were there any adhesions.

Pain was the initial symptom in all these cases, but two, both of which were children, one 5, the other 9, in which the attack was ushered in by vomiting, which persisted for several hours before the onset of pain.

In three of the suppurative but non-perforative type, with the disease still confined to the appendix, the rigidity was so marked on both sides of the abdomen, not even relaxing under anesthesia, that a perforation was suspected.

Two of this series were in pregnant women, one five, the other seven months pregnant. Both aborted. The one pregnant five months had been sick four days and had an appendix with a short mesentery imbedded in the retro-cecal fossa. The other had a perforated purulent appendix adherent to the fundus of the uterus near the umbilicus, and had been sick three days.

One case was a woman weighing 270 pounds, with a ruptured empyema of the appendix in the third day of the disease. Two weeks following operation she developed an acute cholecystitis which was diagnosed but treated expectantly because of the proximity of the discharging well in her abdominal wall. After 24 hours the gall-bladder ruptured and an operation was done, evacuating a pint of bile and pus containing forty-odd stones. She made an uneventful recovery.

I appreciate my good fortune in having so many cases recover, but I feel that with the increasing knowledge of both the profession and the laity, these statistics should, as a rule, be improved rather than otherwise. Even to-day we are getting too many cases in the advanced stages of the disease. As Murphy says, the mortality of appendicitis is that of delay, and every case of appendicitis lost means someone to blame.

*Read before the Buffalo Academy of Medicine, January 6, 1915.

In diagnosis I have come to rely upon the history, and the fingers, *i. e.*, *palpation*. Blood counts were made in a number of this series, but I am coming to place less value upon them, both as an aid in diagnosis and in determining the type of disease; for I find that they are unnecessary in diagnosis and of little value in telling the condition present, several of the pus cases having normal counts and some of the catarrhal cases showing the highest leucocytosis. I have usually found leucocytosis present in my cases, but I have not delayed operation on account of its absence.

My rule has been to operate at the earliest possible moment after the diagnosis was made, never allowing a case to wait for a more convenient time, for I have felt both unable to tell what was going to take place in the abdomen and often what had already transpired.

I believe that our knowledge of how to operate has increased since the time when Ochsner advised delay in cases over 48 hours old, and I hold that all cases should be operated upon when seen if proper operative and post-operative facilities are at hand. I believe that gentleness in handling the tissues, avoidance of more manipulation than is absolutely necessary, ample drainage, plus starvation, proctoclysis, Fowler's position, and if necessary gastric lavage will give a lower mortality and morbidity than non-interference.

I believe with Ochsner that intestinal peristalsis is a great factor in the spreading of a peritonitis, and I allow nothing by mouth so long as a peritonitis exists. I drain all perforated cases and all gangrenous cases where there is pus. I do not consider the mere presence of fluid, no matter how much nor how turbid, an indication for drainage. I make no effort to evacuate pus other than to sponge out that which presents at the wound; believing that the indication is to relieve tension and establish a point of least resistance toward the wound. I use the Fowler, or pelvis-low position in all drainage cases, but I prefer to obtain it by elevating the head of the bed rather than by means of a head-rest or patent mattress, for one can thus be sure that it is always maintained, and I find it more comfortable for the patients.

For drainage I use the split soft rubber tube of one-half inch lumen, placing one tube at the appendix stump and, if there is pus in the pelvis, placing another tube to the bottom of the pelvic cavity. I never irrigate.

In dealing with a localized abscess, I endeavor to wall it off, with gauze, from the general peritoneal cavity before evacuating, not because of the fear of

overflow, but because of the danger of poking the finger among the agglutinated loops of bowel during the delivery of the appendix and thus allowing pus to leak into the general peritoneal cavity without knowing it.

There was but one case in this series in which it seemed wise merely to drain an abscess, leaving the removal of the appendix for a later date. Recurrent discomfort in the appendix region led me to operate upon the case ten months later when an obliterated stump was found, the discomfort being caused by an adhesion running from the cecum to the right ovary.

The principles of treatment have been the same throughout this series. The preparation consists of a dry shave, a coat of tincture of iodine, and a hypodermatic injection of morphine and scopolamine. Operation is performed under combined local and general anesthesia. I greatly prefer nitrous oxide-oxygen narcosis, though a third of this series received ether by the drop method. The use of gas and oxygen unquestionably reduces operative shock and materially aids in lessening post-operative discomfort.

In the majority of these cases the right rectus incision was used, though the low McBurney was employed in about a fourth of the cases seen early. I prefer the rectus incision when a large exposure is needed. The appendix is located as quickly as possible, its mesentery is crushed and ligated in the forceps mark, the appendix is likewise crushed and ligated at its base and cut between the ligature and a forceps. In the non-perforative cases removal of the appendix is preceded by the passing of a linen purse-string suture, and the appendix stump is touched with iodine and depressed into the cecal wall. In the perforative cases a catgut suture is used. If the cecum is edematous and appears friable no burying of the stump is attempted. No endeavor to suture fat or mesentery over the stump is made in cases where the cecum will not hold a purse-string suture. The wound is closed in layers throughout or to the tubes in drainage cases.

Post-operative treatment consists of Fowler's position in drainage cases; continuous proctoclysis in all cases, using sterile tap water in preference to salt solution and adding to it tincture of opium in ten to fifteen minim doses every two to four hours to keep the patient comfortable, supplementing this with morphine hypodermatically in the severe peritonitis cases. Nothing is allowed by mouth so long as there is evidence of peritoneal irritation, and the stomach is washed out if there is any suggestion of regurgitation or gastric dilatation or if vomiting

persists. No cathartics are given and no attempt to move the bowels is made in any case for 48 hours, when a small enema is administered. In the severe cases of peritonitis I endeavor to keep the bowels absolutely at rest and I believe in the use of morphine to the amount required to keep the patient quiet.

This series of successful operations was stopped by a case operated upon within 36 hours from the first symptoms of the disease, a time when we should expect very few fatalities. He had, however, received osteopathic treatment with a view, as the osteopath told me, of massaging his "pylorus" which he located between the umbilicus and the iliac rest. On operation I found a ruptured appendix and about the most extensive peritonitis that it has been my misfortune to see. The patient was overwhelmed by the toxemia and died within 18 hours from the time of operation.

ABSTRACT OF CASE HISTORIES.

J. M., 20, second attack, suppurative, sick 48 hours.

A. H., 25, first attack, perforated, gangrenous, free pus, drained, sick 72 hours.

R. S., 9, first attack, sick four days, gangrenous, pus, drained.

C. B., 10, first attack, suppurative, sick 36 hours.

T. J. G., 25, first attack catarrhal, sick 12 hours.

J. F., 27, first attack suppurative and perforated, drained, sick 48 hours.

E. W., 18, first attack, suppurative and perforated, drained, sick 48 hours.

H. A. F., 20, second attack, suppurative and perforated, drained, sick 36 hours.

A. K., 17, second attack, catarrhal, sick 12 hours.

J. E., 27, first attack, catarrhal, sick 12 hours.

R. G. F., 50, first attack, gangrenous, no drain, sick 18 hours.

J. N., 30, second attack, catarrhal, sick 12 hours.

F. R., 36, first attack, suppurative, sick 18 hours.

W. F., 30, first attack, gangrenous and perforated, drained, sick 72 hours.

D. T., 16, third attack, catarrhal, sick 12 hours.

M. M., 22, first attack, catarrhal, sick 18 hours.

W. S., 9, first attack, catarrhal, sick 12 hours.

M. S., 14, suppurative, sick 18 hours.

W. E., 40, first attack, gangrenous, no drain, sick 36 hours.

A. H. W., 30, first attack, gangrenous, free pus, 2 drains, sick 3 days.

J. C., 10, first attack, suppurative, perforated, drained, sick 50 hours.

L. F., 20, first attack, catarrhal, sick 18 hours.

D. B., 40, second attack, gangrenous, perforated, drained, sick 48 hours.

G. T., 18, first attack, suppurative, sick 24 hours.

E. K., 40, first attack, catarrhal, sick 18 hours.

M. K., 18, second attack, catarrhal, sick 12 hours.

M. E., 18, first attack, catarrhal, sick 18 hours.

W. H. L., 25, second attack, suppurative, perforated, drained, sick 36 hours.

M. S., 17, first attack, catarrhal, sick 6 hours.

R. S., 10, second attack, catarrhal, sick 6 hours.

F. E., 25, second attack, catarrhal, sick 10 hours.

L. P., 30, first attack, catarrhal, sick 18 hours.

S. T., 28, first attack, suppurative, sick 36 hours.

S. P., 30, first attack, suppurative, perforated, drained, sick 48 hours.

J. R., 20, third attack, suppurative, sick 12 hours.

M. M., 24, first attack, catarrhal, sick 48 hours.

M. S., 30, first attack, suppurative, perforated, drained, sick 72 hours. This patient was seven months pregnant.

A. R., 27, first attack, suppurative, perforated, drained, sick 36 hours.

F. N., 33, first attack, suppurative, perforated, drained, sick 48 hours. This patient developed a suppurative cholecystitis two weeks after operation. Gall-bladder ruptured in 24 hours and second operation was made.

E. F., 31, second attack, catarrhal, sick 36 hours.

W. N., 27, first attack, catarrhal, sick 12 hours.

F. G., 18, second attack, suppurative, perforated, drained. This patient had first symptom of pain at 10.30, was operated on at 3, and appendix was found ruptured, and free pus present.

M. D., 12, first attack, catarrhal, sick 12 hours.

P. L., 28, first attack, catarrhal, sick 24 hours.

F. C. G., 20, first attack, catarrhal, sick 18 hours.

M. B., 28, first attack, catarrhal, sick 12 hours.

H. W., 23, first attack, catarrhal, sick 12 hours.

W. J., 30, first attack, gangrenous, perforated, drained, sick 48 hours.

J. M., 30, first attack, catarrhal, sick 18 hours.

J. T., 9, first attack, catarrhal, sick 24 hours.

C. T., 30, second attack, catarrhal, sick 18 hours.

W. C., 31, second attack, catarrhal, sick 18 hours.

C. H., 11, first attack, suppurative, perforated, drained, sick 3 days.

T. B., 7, first attack, suppurative, sick 36 hours.

E. G., 20, first attack, catarrhal, sick 24 hours.

L. S., 20, first attack, catarrhal, sick 24 hours.

M. B., 20, first attack, catarrhal, sick 36 hours.

M. R., 18, first attack, suppurative, sick 24 hours.

C. R., 25, first attack, catarrhal, sick 18 hours.

T. R., 9, first attack, catarrhal, sick 24 hours.

M. M., 29, first attack, suppurative, perforated, drained, sick 36 hours.

W. F., 30, first attack, suppurative, perforated, drained, sick 48 hours.

J. F., 27, first attack, catarrhal, sick 36 hours.

J. S., 20, second attack, suppurative, sick 40 hours.

M. V., 27, numerous attacks, suppurative, sick 24 hours.

F. W., 35, suppurative, perforated, drained, sick 48 hours.

T. G., 33, second attack, suppurative perforated, drained, sick 48 hours.

G. A., 11, first attack, catarrhal, sick 18 hours.

J. D., 22, first attack, catarrhal, sick 24 hours.

E. W., 16, first attack, catarrhal, sick 12 hours.

A. F. B., 23, first attack, suppurative, sick 18 hours.

H. R. W., 30, several attacks, suppurative, sick 18 hours.

M. K., 22, first attack, suppurative, perforated, drained, sick 48 hours. Appendix left in and removed at operation ten months later.

P. B., 19, third attack, catarrhal, sick 18 hours.

F. C., 9, first attack, suppurative, perforated, large amount of free pus, drained, sick 72 hours.

K. B., 26, first attack, catarrhal, sick 24 hours.

E. M., 30, second attack, catarrhal, sick 18 hours.

W. B., 19, several attacks, catarrhal, sick 18 hours.

M. G., 20, suppurative, perforated, free pus, drained, sick 8 hours.

W. S., 33, several attacks, catarrhal, sick 24 hours.

R. S., 14, second attack, catarrhal, sick 48 hours.

M. L., 7, second attack, catarrhal, sick 24 hours.

A. H., 70, first attack, catarrhal, sick 12 hours.

M. H., 9, first attack, catarrhal, sick 18 hours.

J. M., 20, second attack, catarrhal, sick 36 hours.

A. S., 17, first attack, suppurative, perforated, drained, sick 72 hours.

R. V., 32, several attacks, catarrhal, sick 24 hours.

F. B., 35, first attack, catarrhal, sick 18 hours.

A. W., 40, first attack, catarrhal, sick 24 hours.

F. K., 27, first attack, suppurative, sick 90 hours, 5 months pregnant.

A. F., 28, first attack, suppurative, perforated, drained, sick 48 hours.

B. C., 40, several attacks, suppurative, perforated, drained, sick 72 hours.

J. McM., 27, first attack, catarrhal, sick 18 hours.

J. S., 30, first attack, catarrhal, sick 18 hours.

J. H. W., 30, first attack, suppurative, perforated, drained, sick 36 hours.

J. D. M., 22, first attack, suppurative, perforated, drained, sick four days.

H. F., 11, first attack, suppurative, perforated, drained, sick 3 days.

H. P., 17, second attack, catarrhal, sick 24 hours.

J. H. K., suppurative, perforated, drained, sick 5 days.

M. G., 5, first attack, suppurative, perforated, much free pus, drained, sick 48 hours.

H. P., 18, first attack, catarrhal, sick 24 hours.

P. E., 24, second attack, catarrhal, sick 24 hours.

R. F., 20, first attack, suppurative, perforated, drained.

E. P., 11, first attack, suppurative, perforated, extensive peritonitis, drained, sick 4 days.

R. C., 12, first attack, suppurative, sick 3 days.

F. H., 18, first attack, suppurative, perforated, drained.

I. R., 22, first attack, catarrhal, sick 24 hours.

L. R., 26, first attack, catarrhal, sick 18 hours.

M. K., 29, first attack, suppurative, perforated, drained, sick 10 hours.

J. B., 7, first attack, suppurative, perforated, much free pus, drained, sick 72 hours.

A. K., 8, catarrhal, sick 24 hours.

W. H., 10, first attack, suppurative, sick 18 hours.

A. S., 28, second attack, gangrenous, perforated, drained, sick 48 hours.

R. W., 19, first attack, suppurative, sick 24 hours.

479 DELAWARE AVENUE.

THE PREVENTION AND TREATMENT OF THE DISABILITIES FOLLOWING FRACTURES OF THE LIMBS.

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(Continued from the March issue.)

1. Disability from Lesions of the Soft Parts.

In every fracture there is contusion, ecchymosis, extravasation, and often muscular laceration, accompanying the osseous injury; and the disability which follows the fracture, in a large proportion of cases, is due to *neglect of the soft parts*, while attention has been concentrated upon the bony deformity.

Yet the surgeon must not neglect the osseous lesion in his devotion to the care of the soft parts. There is a happy medium between the school of Lucas-Championnière, which ignores the bones and devotes all its attention to the soft parts by massage and by mobilization of the neighboring joints, and the modern operative school which teaches that so long as the ends of the broken bone are brought into absolute anatomical reposition the soft parts may be safely left to take care of themselves. The former school has the merit of recognizing that the bones are not sticks or stones or bars of iron, but that they are living tissue, and if given even a slight chance will rectify their own deformities in many instances and so produce no lasting disability; while the operative school is too prone to ignore primary lesions of the soft parts, and to blame all subsequent disability not on these (the real cause) but on insignificant osseous distortions appreciable only on skiagraphic examination.

It is not my purpose now to describe in detail the methods to be employed in proper care of the soft parts, but I may state as a general rule that for the first week or ten days the condition of the soft parts should receive paramount consideration, especially when the fracture is not close to a joint. When the fracture is close to a joint there is no doubt that the easiest means of relieving the swelling of the soft parts is to secure anatomical reduction of the fragments as soon as possible; and this no doubt is true also though in less degree in the case of fractures in the shafts of long bones. But in the latter instances it is very much more difficult to secure accurate reduction without open operation than when the fracture is close to a joint, and malunion of a diaphyseal fracture *per se* is very rarely a cause of disability. Hence I believe that in diaphyseal fractures attempts at reduction sometimes may be postponed for a few days until the swelling begins to subside. Up until

the end of the first week no insuperable obstacle to reduction will develop, unless it was present also from the very moment of the accident, as for example, entanglement of the fragments in the soft parts.

Proper care of the soft parts requires that the dressing be removed two or three times weekly (less often as the case advances) to permit cleansing of the skin; and as union progresses to allow of very gentle passive movement of the neighboring joints. Such passive movements should never cause pain, and as already indicated should be substituted by active movements so soon as union of the bones permits.



Fig. 1.



Fig. 2.



Fig. 3.

One of the most frequent causes of disability due to neglect of the soft parts is edema of the limb below the seat of injury. Of course such edema is not always avoidable in the lower extremity, but in the upper limb it is nearly invariably an evidence of neglect. A common and perfectly unjustifiable error is neglect to bandage the hand and forearm in cases of fracture of the humerus, or even neglect to bandage below the wrist in cases of fracture in this situation. In treating a Colles's fracture of the radius, for instance; it is no unusual fault for the dresser to leave the hand and fingers totally unsupported by the bandage, no turns of which pass below the thumb; the result is that the hand and fingers become very edematous, and stiffness, pain and marked disability persist in the fingers long after the bone has united. Similarly, in fractures of the humerus, the dresser will make all secure from the shoulder to the elbow, but will leave the hand and forearm bare; they then become edema-

tous, and long after the shoulder is healed, the patient must be treated for stiffness in the wrist and fingers. Only last summer I had to keep such a patient under treatment for more than three months after the shoulder fracture ceased to trouble her, because she was totally incapacitated by the condition of her hand; even more incapacitated, indeed, than if her hand had been amputated for those three months, since she suffered much discomfort from its presence.

In the lower extremity, as I have said, swelling of the foot cannot always be prevented during convalescence, owing to its constantly dependent position; but I am sure much less disability would re-

sult on this score if the soft parts of the lower extremity received, as is their due, two or three times weekly, proper "dressing" as in the case of fractures in the upper extremity, instead of being imprisoned for weeks at a time, as is usually the case, in circular gypsum cases.

Perhaps the most conspicuous example of lesions of the soft parts overshadowing those of the bones, is to be found in cases of Volkmann's contracture. Though this seriously disabling condition occasionally has developed in cases where no dressings at all have been employed, it is the result, in the vast majority of instances of constriction from too tightly applied splints or bandages, particularly when these are not removed for some days or weeks at a time. It should be an invariable rule for the surgeon to see the patient the next day after the fracture, and personally to examine the condition of the finger tips and make certain that there is no interference with the circulation, and that the

dressing is comfortable. An uncomfortable dressing always is inefficient even if not positively harmful.

2. Compound Fractures.

There is no class of fractures in which care of the soft parts assumes such importance as in compound fractures. Here the bones are quite a secondary consideration; and even in cases where immediate formal operation is required it is usually inadvisable to apply plate or other form of internal fixation until asepsis can be assured by definitive healing of the soft parts.



Fig. 4.

I cite below several illustrative cases, in all of which the state of the soft parts made it proper for the first dressing to assume the character of a major operation.

CASE I: Compound comminuted fracture of radius and ulna, rupture of ulnar artery and nerve, etc.

Fred B., aged 28 years, was admitted to Dr. Frazier's service in the Episcopal Hospital, Dec. 12, 1909. His left forearm had been crushed between two freight cars while he was engaged in coupling them. All four ends of the broken radius and ulna projected through a jagged wound of the soft parts, the skin being torn loose all around the circumference of the limb except for 4 cm. over the extensor surface of the radius, and the flexor muscles being extensively ruptured. There was loss of sensation in the distribution of the ulnar nerve below the injury. I operated about eight hours after injury. The ulnar artery was crushed and its ends widely separated; both ends were ligated. The ulnar nerve was crushed for a distance of 4 cm., only the fibrous sheath remaining intact. By dissecting the proximal end even to the elbow, and the distal end to the wrist, and by flexing the wrist, it was impossible to make the

ends of the ulnar nerve meet by 1.25 cm. Therefore a flap was turned up from the distal segment of the nerve, about 3 cm. in length, and sutured to the central end, without tension. The ends of the radius were drilled, and united by a suture of chromic gut No. 3. The ulna was found to be broken in two places, the intervening fragment being composed of three splinters. Silver wire was wrapped around these splinters, and they were sutured to the lower fragment of the ulna by chromic gut, passed through drill holes. A rubber drainage tube was passed across the flexor surface of the bones, and the ruptured muscles were carefully repaired. The limb was kept vertical, and alcohol douches were given as often as the dressings became dry.

The attempts to secure fixation of the bones were not very successful, as is evident from skiagraphs made soon after operation; this gives one the impression that the bones might have been struck by lightning. There was prolonged but never very active suppuration and sloughing, and the three splinters composing the middle fragment of the ulna were soon discharged as sequestra. Bony union occurred in the radius, but only fibrous union in the ulna. About a year after the accident, and when the soft parts had been healed for more than eight months, a sequestrum worked loose from the radius. Though an excellent result was obtained eventually, I believe even the little that was done to the bones at the time of operation tended to delay repair.

Compare, for instance, the much more rapid recovery in the following even severer case.

CASE II: Crush of forearm, double compound fracture of the humerus.

Fred H., aged 35 years, was admitted to my service in the Episcopal Hospital May 27, 1913. His right arm had been caught in machinery, and he had been knocked up against the ceiling and then flung across the room. Here also all four ends of the broken radius and ulna projected from a gaping wound in the flexor surface of the forearm; there was also a double fracture of the humerus of the same side, and one of the fragments of the humerus was projecting through the skin, on the inner side of the arm, below the axilla.

Operation was immediate. Fortunately no arteries or nerves were injured; only the basilic vein, transfixed by the humeral fragment, required double ligation. The upper fragment of the ulna was resected, as it could not be satisfactorily cleansed. Partial reduction of the various bony displacements was made, but no form of internal fixation was employed. Skiagraphs, made as soon as the patient could be moved from his room, showed that fairly good position of the bones had been secured. The soft parts healed with very little sloughing, no sequestration of the bones occurred, and firm union developed in the humerus within six weeks (Figs. 1 and 2). Though only fibrous union occurred in the forearm, and necessitated a subsequent operation, it is manifest that no attempt at primary fixation of the fragments would have obviated this result; while the absence

of foreign bodies from the wounds permitted rapid healing of the soft parts, a contrast to the cases where metal splints are employed.

I may add that in spite of the extensive lesions of the soft parts in Cases 3 and 4, there was never any disability from stiffness of the neighboring joints; the fingers are perfectly supple.

CASE III: Compound comminuted fracture of radius, and compound dislocation of ulna at wrist.

William E., aged 52 years, had his left forearm caught in machinery, Oct. 13, 1914, and was brought to the Episcopal Hospital. The carpal extremity of the ulna was sticking out through the soft parts for three or four inches, and there was a compound

arm was suspended vertically for a week. The patient's temperature fell at once, the swelling subsided within a couple of days, and by dint of absolutely disregarding the position of the bones, it became possible to save the patient's arm, which was in a condition almost justifying amputation when first seen. Fig. 3 is from a skiagraph made 17 days after the operation; it shows the ulna still projecting far beyond the soft parts, and the radial fragments overlapping until the joint surface is at the level of the upper fragment. The ulna gradually was covered in by the soft parts, and two months after operation projected less than an inch. Fig. 4, from a skiagraph made nearly three months after opera-



Fig. 5.



Fig. 6.

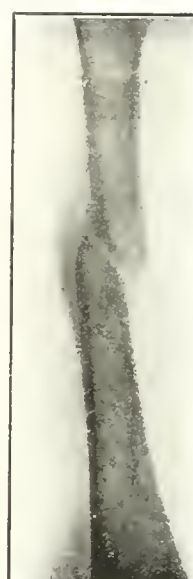


Fig. 7.

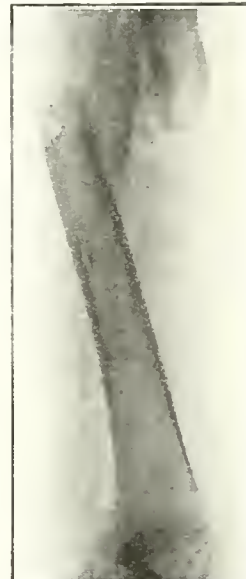


Fig. 8.

comminuted fracture of the radius, with great laceration of the soft parts. After having his wounds dressed in the receiving ward, the patient absolutely refused to remain in the hospital, maintaining that the injury was trivial. Four days later, October 17, he presented himself at the dispensary, and was again urged to remain in the ward, but again went home. On his return home, however, he found himself so weak that he sent for the ambulance, which brought him to Dr. Frazier's service at 5.30 p. m.

Operation. At 7.30 p. m., I operated. The hand, forearm, and hand were greatly swollen; there were lymphagitic streaks extending toward the axilla, and the man was very septic, with a temperature of 101° F. All the sutures were removed, and the original wounds were enlarged, giving vent to large amounts of pus. The lower end of the ulna was again luxated, and was left protruding for about 7 cm. (nearly 3 inches), in order to provide for drainage; and a tube was passed through the wrist joint, which was full of pus, and another tube across the forearm at the site of fracture, through the interosseous space. Culture of the pus gave a pure growth of staphylococcus aureus. All opened surfaces were swabbed with hot carbolic solution (1:20), alcohol dressings were applied, and the fore-

tion, shows to what a surprising degree the radial deformity has been spontaneously corrected. On January 15, 1915, three months after injury, I resected the end of the ulna, and removed a few small sequestra from the radius, in which fibrous union was present. There was at this time scarcely any suppuration from the few sinuses still present, and active movements in the fingers were beginning to be possible.

This case shows the great danger of inefficient care of the soft parts from the first. Had the patient been willing to remain in the hospital when first injured, with his forearm in vertical suspension, and with irrigation, it is quite possible that no serious infection would have occurred; and that the soft parts would have been in a condition to warrant one in correcting the bony deformity before malunion had occurred. As it is, the man put his life in jeopardy, very nearly lost his arm, has been totally incapacitated for months, and will never possess a very useful hand.

3. Treatment of Disability from Lesions of the Soft Parts.

Active movements and functional use of the limb

are the most important factors in overcoming disabilities due to lesions of the soft parts; *massage* is a valuable adjuvant; but passive movements, especially if forced, usually are useless and often are harmful. These facts should be, and indeed actually are well known, but I see them ignored with lamentable frequency. To cite a case in point:

CASE IV. *Stiff elbow following forced passive movements after fracture.*

A surgeon brought his nephew to see me August 9, 1911. The boy, aged 7 years, had injured his left elbow eight weeks previously. His uncle had dressed the elbow in the Velpeau position, and had



Fig. 9.

a skia-gram taken, which showed a fracture of the external condyle of the humerus, not fully reduced. Three weeks after the injury the boy was taken to a consultant, who made further attempts, under ether, to reduce the deformity. The elbow was then dressed on an anterior right angled splint for two days; then all dressings were discontinued, and four days after the attempted reduction passive movements were prescribed. This prescription was carried out most energetically by the masseur, who *forced* the elbow into full flexion and full extension *every day* for three weeks continuously. By this time the boy had suffered so much pain, and the elbow had become so manifestly worse, that a halt was called.

When I was asked to see the boy, eight weeks after the injury, and one week after passive motion had been stopped, I found the joint hot, tender, and painful on motion. The range of motion was only 50 degrees (85 to 135 degrees). The lower end of the humerus was half again as thick as normal in its antero-posterior diameter and there was tenderness on pressure over both biceps and triceps. Skia-grams made the previous day showed the joint fairly normal, but there was new formed subperiosteal bone on the front and back of the humerus, where the forced passive motion had exerted its

greatest influence; while the only new-formed bone visible in antero-posterior view was above the fractured external condyle; but there was very little exuberant callus here.

My advice was to do absolutely nothing to the boy's elbow for a month, and to let him use it as he wanted. His uncle afterwards reported to me that at the end of two months the range of motion in the elbow was very nearly normal in both flexion and extension, and that the joint gave no further trouble.

This lesson I learned early in my professional life. As a resident physician in the hospitals some of my chiefs "believed in the use of early passive motion" for fractures around the elbow; and many is the elbow on which at their instigation I enforced violent passive movement with the idea of preventing or of breaking up adhesions, destroying or wearing away exuberant callus, etc. The children kicked, screamed, and yelled; their parents, the orderly, and the nurse held them still, while I gave them excruciating pain, and unwittingly aroused more osteogenetic and inflammatory processes around the elbow than were present before; and I never saw an elbow which failed to stiffen up under this treatment. Fractures around the elbow I regarded as hopeless; I anticipated a stiff joint, deformity, or at least considerable limitation of motion almost in every case, and I rarely failed to find it. But as years have gone by I have become more and more convinced of the truth of Stimson's epigrammatic statement: "If you leave the arm alone, you save your time, and the patient's time, and he gets well quite as promptly."

Now what is true of the elbow joint is true of all joints; and even in the case of fractures of the diaphyses of long bones, *forced, painful, passive movements always are to be avoided*. If the neighboring joints are stiff, encourage the patient to use the parts as much as he can; aid the absorption of exudate by hot-air baking and massage; but beware of passive motion.

It must be admitted, however, that occasionally in adults it is possible to improve the range of motion in a joint by forcible passive movements under an anesthetic; but it is possible only when the joint is no longer hot and painful, only when the inflammatory reaction initiated by the fracture has long since subsided.

4. *Fractures in the Diaphyses of the Long Bones.*

I come next to speak of the supposed necessity, or at least of the propriety of securing anatomical replacement of the fragments in a diaphyseal fracture. Not only is *such* replacement often impossible, but I do not hesitate to state that in most cases I regard it as totally unnecessary. Reasonably

accurate reduction is desirable, and usually possible; but it is a very rare thing for disability to result solely from failure to secure anatomically accurate reduction of such a fracture. It is sufficient, in such fractures, as I have pointed out on former occasions, to secure *firm bony union*, with *no appreciable shortening*, and with *preservation of the axis of the limb*. The power of nature in rounding off bony prominences and in bridging gaps by callus is especially manifest in childhood; and it is in them that the most satisfactory results are obtained from unpromising beginnings. But this power, though less manifest in adults still is active in them. Let me cite several cases in illustration.



Fig. 10.



Fig. 11.

CASE V: *Comminuted fracture of left femur; irreducible; recovery without disability.*

Milton G., aged 7 years, was admitted to Dr. Frazier's service in the Episcopal Hospital Nov. 1, 1914. A wagon had run over the boy's thigh, and on account of the condition of the soft parts, attempts at reduction were delayed. There was 1.5 cm. shortening. Meantime the limb was placed in a Hamilton splint, and sufficient weights were applied to overcome shortening almost entirely. Skiagraphs, however, showed very marked displacement of the fragments (Figs. 5 and 6). On November 20 the child was etherized and I made attempts to secure reduction. Subsequent skiagraphs showed that the position was scarcely at all improved, and on account of the very wide separation of the fragments, I feared non-union, in spite of the patient's youth. Therefore I thought that operative reduction was indicated. But two days later, November 22, before operation could be done, the children's ward was placed under quarantine for an outbreak of scarlet fever. The limb was therefore re-dressed on a Hamilton splint, and conservative measures continued. On Decem-

ber 20, some union was apparent, and early in January union became very firm. There was now only 0.5 cm. shortening. The *vis medicatrix nature* had done its work well (Figs. 7 and 8). Toward the end of January, the boy was able to walk, and there is every prospect of his ultimate recovery of perfect function.

This case of course is an extreme example, but serves well to demonstrate the slight importance in children of accurate anatomical reduction of diaphyseal fractures. Let me now cite some cases in adults: one such is the fracture of the humerus (a double compound fracture) which occurred in the patient already recorded herewith as Case 2. Other examples are the following:

CASE VI: *Fracture of shaft of femur, unreduced for thirty years. Shortening 6.5 cm.; very little disability.*

A man, aged 50 years, came under my care in Dr. Frazier's service at the Episcopal Hospital in August, 1911. Thirty years previously he had sustained a fracture of his femur; he had just fallen again, and feared he had re-fractured the same bone. There appeared, however, to be only a contusion. For thirty years this patient had pursued his usual occupation, entailing hard physical labor, earning from three to four dollars daily, with shortening of 6.5 cm. He wore a lift in his heel, and walked without a disabling limp. He had some pain in his thigh in damp weather. I asked him how much he could have made if his thigh never had been broken, and he replied, perhaps five or six dollars daily.

CASE VII: *Fracture of left femur, unreduced; no disability.*

Louis M., aged 55 years, was admitted to Dr. Frazier's service in the Episcopal Hospital Oct. 31, 1914, with compound fractures of both femurs. In the preceding May he had fractured his right femur, but the second fracture, in November, 1914, occurred a little below the previous injury. The skiagraph made after the second fracture (Fig. 9) shows that the first fracture had united with considerable deformity. In spite of this deformity, this patient had only 2 cm. shortening on leaving the hospital after his first accident. He had used crutches for five weeks after his discharge, being out of work thirteen weeks in all; and had worked as teamster until his second accident, without any disability whatever. His knee, he said, flexed to a right angle; he wore no raise on his heel to compensate for the shortening, and he considered himself an entirely able-bodied man until his second accident. No better proof of the solidity of the union could be required than is furnished by the fact that the second accident produced not a re-fracture at the site of the old injury, but an entirely distinct fracture below.

Of course the results in these patients do not form an argument against attempting to secure better reduction, but they certainly prove that very

marked deformity (so long as the axis is preserved) in a diaphyseal fracture may cause very little disability. These cases are examples of extreme deformity; and if satisfactory function can be secured in such cases, much more certainly will it be secured in cases where the primary deformity is slight or in those in which reduction is easily obtained. Certainly I admit, and no one will dispute, that it is desirable to secure as accurate reduction as is possible; but I contend that sufficient reduction usually can be secured (almost always in children) without open operative intervention.*

5. Fractures Near Joints.

Very different are fractures near joints. Quite apart from the questions of axial deviation, of ro-

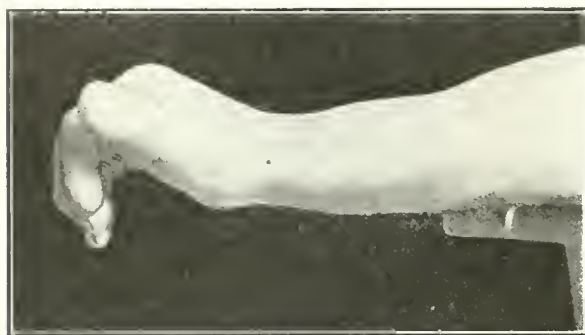


Fig. 12.



Fig. 13.

tatory deformity, of shortening, and of lesions of the soft parts (all of which factors must be considered here as well as in fractures of the diaphyses), there is the additional and all-important factor of *impairment of joint motion*. Unless accurate reduction is secured there will be permanent disability of some degree, varying with the extent of persistent deformity.

Fractures at the elbow and the ankle probably furnish the largest proportion of cases of disability and from the slightest grades of deformity; but fractures at the wrist are a frequent cause; while those of the shoulder and hip, though relatively less frequent, nevertheless present a rather high percentage of disability. Fractures at the knee (except those of the patella, which may be disregarded in this connection) are so rare that few such patients are seen complaining of disability.

It will be noted subsequently that *nearly all fractures which require operation for the relief of disability due to malunion of the bones are frac-*

tures near joints. So convinced am I of the necessity of securing accurate reduction in joint fractures, that I believe open operative reduction should be undertaken in the vast majority of cases where bloodless attempts fail to secure anatomical reposition. Of course open treatment in these as in other fractures must not be adopted except where suitable facilities exist, both as regards the operator and the operating room.

Fortunately the bloodless reduction of joint fractures is relatively easy compared to that of diaphyseal fractures, since the position of the shorter fragment usually can be controlled through the neighboring joint. Thus, *abduction* at the shoulder and hip, *flexion* at the elbow and knee, and *adduc-*

tion at the wrist and ankle may be employed when necessary to maintain the fragments in apposition.

I believe it is much more important, also, in joint fractures than in diaphyseal fractures for reduction to be secured as soon as possible after the accident. Delay of three or four days may not only render reduction extremely difficult or even impossible, but may allow such swelling of the soft parts to occur as to ensure disability on this score even if reduction of the bones is subsequently obtained.

It is important also in joint fractures, when once accurate reduction has been obtained, to leave the joint at rest until bony union has occurred. Attempts at early passive motion are particularly harmful in these fractures. When once bony union has occurred, the patient will be able to execute active movements without pain, and in this manner will regain the normal range of motion in a short time. If stiffness persists, it is due to the condition of the soft parts; and this condition is due in its turn either to failure to reduce early enough and accurately enough, or to neglect of the soft parts while the fracture was mending. If the soft parts are in good condition and joint motion is persistently limited, it will be found that whatever

*I may here emphasize the importance of the position in which the limb is dressed, as one of the most valuable aids to reduction. Weight extension, moreover, is applicable to fractures of the upper limb as well as to those of the thigh and leg, though this fact often is forgotten. I merely mention in passing the value of Stemmman nail extension in fractures of the leg, where the seat of fracture is too low for the ordinary Buck's extension apparatus to be efficient.

range of motion exists is painless, and that arrest of motion at each end of the arc is produced by bony contact. Under such circumstances no increase in the range of motion can be secured except by operation (excision of callus, arthroplasty, etc.). If motion is painful, and it is not arrested by bony contact, improvement may be looked for as the condition of the soft parts returns to normal, under conservative treatment (active movements, light massage, hot-air baking, etc.).

6. *The Propitious Time for Operation.*

It is important to determine as soon as possible after the injury whether or not operation will be required; and the operation, if required, should be undertaken neither too early nor too late. Except

require postponement of the operation for two weeks or even longer. And in any case where the skin is broken (as is frequently the case in fractures of the leg, even when there is not a true compound fracture), it should be the invariable rule not to operate until the skin is soundly healed.

On the other hand, an operation once being determined on, it should not be unduly postponed. It is both more difficult and more dangerous to correct malunion or nonunion by operation than it is to prevent them by the same means. If malunion occurs it is often impossible to overcome the shortening, and the most that can be done is to restore the axis of the limb, or to relieve the soft parts of injurious pressure by excision of exuberant callus, etc.



Fig. 14.



Fig. 15.



Fig. 16.

in the case of severe compound fractures, when the first dressing should assume the character of a formal operation, it is not desirable to operate before the fifth day. But it is possible, almost always, by the tenth day after the accident, to know whether or not operation will be required. This allows time for thorough examination and diagnosis, including the making of the necessary skiagraphs (always in two planes), as well as for attempts at reduction (under an anesthetic if necessary), and for the making of more skiagraphs to learn what has been accomplished.

Operations before the fifth day are more dangerous than those done between the fifth and tenth day, because the condition of the soft parts predisposes them to infection. It is best not to operate until sufficient time has elapsed for subsidence of swelling and commencement of organization of the effused blood. In the case of the femur this may

Nonunion, except in compound fractures, almost always is due to imperfect reduction of fragments when the fracture was recent. When operation is delayed beyond the second week, there is almost always found more or less osteoporosis of the distal fragment; this renders it difficult to make screws hold in it, and it is often necessary to reinforce the application of a plate by encircling wires.

Hence it is the duty of the modern surgeon to learn and to teach others which classes of injury require primary operation, and which do not. He should not start out with preconceived notions, that all fractures require primary operation, or on the other hand that primary operation is never necessary. Nor should he base his judgment on purely theoretical grounds. I believe the best and safest way to acquire knowledge on this subject is to study the end-results of fractures, and to work backward from them until we learn which fractures, and with

what grades of primary and unreduced deformity, give us lasting disability, and which do not.

7. Treatment of Disability following Diaphyseal Fractures.

If operative treatment is required for old diaphyseal fractures it is because of nonunion or because of concurrent lesions of the soft parts, and scarcely ever because of malunion of the bones. This statement embodies the conclusion I have reached by a study of end-results. In the patients who have come under my care for disability following diaphyseal fractures, the disability was clearly due to one of two factors: either nonunion or lesions of the soft parts.

Malunion in a diaphyseal fracture, regarded as affecting the bone itself, may cause (1) shortening, (2) axial or rotatory deformity, or (3) nonunion may be present. Neither malunion nor nonunion of themselves will interfere with the free movements of the neighboring joints. Such limitation of motion, as well as persistent swelling, aches and pains, stiffness in wet weather, etc., almost without exception are due to concurrent lesions of the soft parts. I have cited already several examples to demonstrate the very slight disability which follows even considerable bony deformity, so long as the soft parts are in good condition. Shortening alone, even in the lower extremity, causes surprisingly little disability, so long as union is firm and the axis of the limb is preserved. Now, though shortening of 1 to 3 cm. is sufficiently common after non-operative treatment, axial and rotatory deformity are very rare, and scarcely need be considered as causes of disability.

Nonunion is the chief factor which causes disability in cases of diaphyseal fracture; but it also is comparatively very rare. In all the recent fractures treated by myself, probably approaching a thousand in number, I have never yet had a case of nonunion, except in a few cases of severe compound fracture in which immediate operation was required on account of the condition of the soft parts (Cases 1 and 2 are examples), and in some cases of fracture of the neck of the femur in the aged.

On the other hand, I have seen numerous cases in which lesions of the soft parts were the cause for which the patients sought relief.

CASE VIII: Malunion of fracture of radius and ulna; paralysis of ulnar nerve.

Dolores D., aged 13 years, was referred to my service at the Episcopal Hospital Nov. 16, 1914, by Dr. E. E. W. Given. On August 6, 1914, this girl had sustained a fracture of both bones of the left forearm; four weeks after the splints had been removed, and eight weeks after the first accident, she

fell again, but did not completely re-fracture the bones. Splints were re-applied for a further period of about four weeks, but after their removal pain and disability persisted, and considerable bony deformity was present. When the child first came under Dr. Given's notice, in November, more than a month after the second injury, there was readily visible bony deformity, and the hand was not only useless, but the seat of constant pain. There was anesthesia and hyperesthesia in the distribution of the ulnar nerve, with wasting of the thenar and hypothenar eminences and of the interosseous muscles.

At operation, November 25, 1914, the ulnar nerve was found caught in scar tissue over the lower end



Fig. 17.

of the upper ulnar fragment (Fig. 10). Union in both radial and ulnar fractures was only fibrous, and resection and plating of both bones was done. Within three days there was evidence of some return of sensation in the ulnar distribution, and by the end of a week sensation was normal. Progress thereafter was uneventful. At the end of four weeks firm union was present, the soft parts had returned to normal, and a fair range of rotation was present.

It appears to me that if proper care had been taken of the soft parts, bony union would have occurred, even after the second injury, in spite of the deformity present; and that this deformity alone would not have been a cause of much disability. Opportunity being afforded for operation, because of the nerve lesion, I believe I was justified in securing better reduction of the fragments.

CASE IX. Malunion of fracture of radius and ulna; disability from adhesions of the soft parts.

Joseph P., aged 43 years, was referred to my service at the Episcopal Hospital in February, 1914. Two months previously his hand and forearm had been caught in a cable, fracturing the radius and

ulna above the wrist, and greatly contusing the soft parts. The fractures had united with scarcely any axial displacement, though the lower fragments were displaced toward the extensor surface (Fig. 11). Wrist motion was greatly limited, and though rotation of the forearm was possible through more than half the normal range, the hand was perfectly useless, owing to inability to make a fist (Fig. 13). For more than six months this man was treated by massage and passive motion, with negligible improvement. He then consented to an operation, which was done August 8, 1914, and consisted simply in clipping off the bony angles, and thoroughly freeing the adherent muscles, back and front (Fig. 12). The result was restoration of normal rota-

ments, since less compensatory bone changes can occur when one fragment is very short than when both are of nearly equal length. A slight tilt of the short joint fragment will cause marked deviation of the articular surface. I have already emphasized, perhaps sufficiently, the importance of accurate reduction in these lesions, and have cited cases indicating that in most instances such reduction can be obtained without resort to operation; but I cannot refrain from quoting some further examples which illustrate the very serious disability which follows neglect of accurate reduction.



Fig. 18.

tion, and very nearly normal movements in the wrist. But it was still impossible for him to make a fist, owing to persisting adhesions in the hand and fingers. Finally, on November 11, 1914, he was again etherized, and these adhesions forcibly ruptured, and the fingers dressed in full flexion. This could not be maintained, however, and when last seen, early in December, 1914, he was still unable to make a tight fist, and therefore to hold a trowel and resume his former work as plasterer, though the condition was probably 75 per cent. better than before operation, and he could still make a living at other work (Fig. 13).

In this patient the deformity was by no means so great as to produce disability by itself; and if it had not been for adhesions of the soft parts, I have no doubt that an excellent functional result would have been secured without operation.

8. Treatment of Disability from Fractures near Joints.

When a fracture occurs close to a joint, very slight deformity may entail great disability. In the first place it is more important here than in the shaft of a long bone to maintain the axis of the frag-

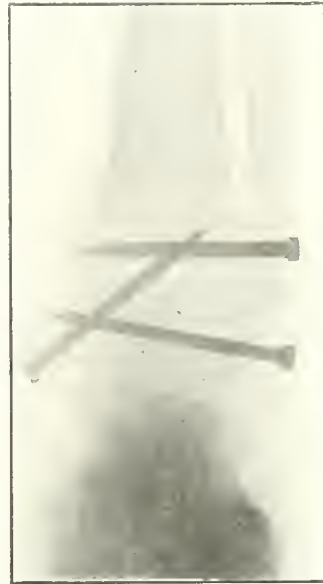


Fig. 19.

CASE X. Malunion of a Colles' fracture of the radius; median neuritis; resection and screw fixation.

Anna K., aged 28 years, sustained a Colles' fracture of the right radius June 1, 1914. She was treated by her family physician, who placed the forearm on a straight palmar splint, but made no attempt to "set" the fracture. Over fourteen months after injury this young woman came under my care, complaining not only of the conspicuous deformity (Fig. 16), but of complete disability, from weakness, loss of flexion at the wrist, and sweating and paresthesia in the distribution of the median nerve. She was admitted to my service at the Episcopal Hospital, and I operated October 10, 1914. The carpal fragment was found united by bone to the extensor surface of the diaphysis, while the fractured surface of the diaphysis, free of all bony contact, jutted up against the median nerve and flexor tendons (Fig. 14). Resection and screw fixation restored the parts to normal (Fig. 15), and on December 12, one week after her return to her usual work in a mill, the grateful patient returned to report that she found her hand in every

way as good as it had ever been before the accident (Fig. 16).

CASE XI: Malunion of fracture at ankle. Resection and screw fixation.

James C., 31 years old, fractured his left ankle in July, 1914. In September, 1914, he came under my care in the orthopedic service at the Episcopal Hospital, because of persistent disability. He was unable to dorsiflex the foot beyond 90 degrees, and as a consequence had to walk with his whole limb in external rotation, carrying the foot in the coronal plane of the body. Even thus he suffered constant pains along the fibula from the external malleolus upward. A skiagraph (Figs. 17 and 18) showed an unreduced oblique fracture of the lower fifth of the fibula, entering the ankle joint and detaching also the adjacent surface of the tibia. The astragalus was dislocated slightly backward, with the foot, and there was distinct diastasis at the tibio-fibular joint, the fibula being abnormally movable on the tibia in the antero-posterior plane. A fracture of the internal malleolus was not visible in the skiagraph.

I kept this man under observation for two months, hoping that improvement might occur; but he persistently urged operative treatment, on the ground of absolute disability for his former work. Finally, on December 9, 1914, five months after the fracture, I operated, resecting the line of fracture in the fibula, cutting a new groove for it in the tibia, detaching the misplaced internal malleolus (which was now seen to have been fractured) and restoring it to its normal position. The fragments were fixed by three large Lambotte screws. Figs. 19 and 20 show that the posterior displacement of the fibula and astragalus has been overcome, and that the fibula is fixed firmly against the tibia.

Not until eight weeks after operation was this man allowed to bear any weight on his limb. He was then able to walk painlessly and without further disability.

In these and similar cases the proper time for operative reduction of the deformity (if bloodless reduction was impossible) was while the lesions still were recent, and not after malunion had occurred, and the patients had been disabled for months.

9. Treatment of Non-union.

As I have already indicated, comparatively few cases of real nonunion have come under my care. The distinction between delayed union and non-union may be said to be that, in the former, union will occur eventually without operative interference; while in cases of true nonunion the bones remain ununited in spite of all methods of conservative treatment. I think this distinction is important to bear in mind, and believe that the surgeon should not be inclined to rush his patient with delayed union into a possibly very brilliant but by no means necessary operation. I am sure that in a good many of the cases of operative treatment of so-called non-

union now being reported in medical literature, non-operative measures might very well have been effectual in securing bony union, and in as short a time as by operative treatment. I have especially in mind just now delayed union in fracture of the leg; I know of a case of this kind where bony union had not developed at the end of six weeks, and the surgeon at once resorted to bone transplantation. The operation was perfectly successful, and firm bony union developed. But then I recall numerous similar cases of delayed union where the patients developed bony union within a few weeks after being allowed to walk around in their gypsum cases. Of course if there is marked deformity in a case of delayed union, a better end result usually will

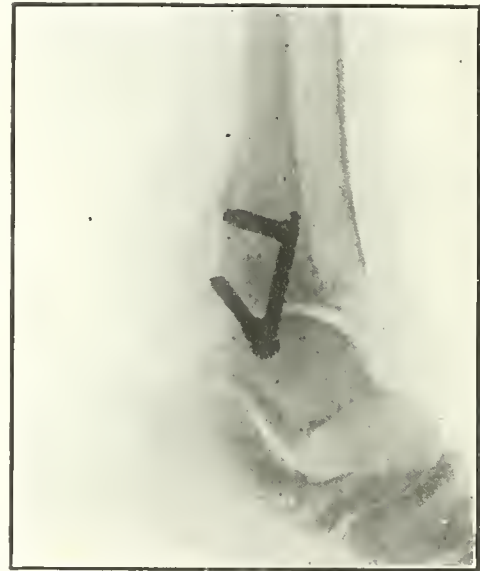


Fig. 20.

be secured by operative means, since reduction of the deformity can be obtained at the same time that bony union is encouraged.

But the surgeon must nevertheless stop to consider whether the patient's condition is not good enough as it is, even though firm union is not present. He should remember that bony union does not necessarily follow operation, and that operation may even make the patient's condition worse.

There appears to be little doubt that the most efficient way to secure bony union is to insert a bone transplant. I have recorded elsewhere (*Annals of Surgery*, 1914, ii, 779) the very satisfactory result obtained by this means in a case of nonunion of the neck of the femur, in a young adult who had been unable to walk without crutches for eight months; and I have also employed it in the forearm. In young children, where the osteogenic powers are so much better than in adults, I prefer,

when nonunion occurs in a joint-fracture (I have operated on three of the external condyle of the humerus), to fix the fragments with sutures or screws, after freshening their surfaces.

Conclusions.

The conclusion of the whole matter seems to me to be a recognition of the fact that it is necessary and always will be necessary, for a large proportion of the profession, who are not trained surgeons, to have cases of fracture under their care. They cannot avoid it. They cannot adopt operative treatment even when it is requisite to prevent disability. The only remedy is to have them so well trained in measures that they can apply, as to enable them to secure the least possible degree of disability.

Then I believe the average surgeon should recognize that the operative treatment of fractures is not as indispensable as some writers would have us believe; and that he should continue in the future, as he has in the past, to give preference to non-operative methods; that he should feel prouder of curing ten patients without disability and without resort to operation, than of recording fifty or one hundred brilliant operations, most of which were really quite unnecessary had he only known enough surgery to make efficient use of non-operative means.

It is important also for the trained surgeon in charge of a case of fracture to be capable of recognizing while the lesion is still recent, whether or not open reduction is requisite. That cases requiring open treatment exist, even the utmost conservatism cannot deny; cases in which it is manifestly impossible to secure any sort of respectable result without operation.

Finally, may I venture to suggest that the patient's interests might perhaps be promoted, if not only the general practitioner but the average general surgeon as well should feel a little more Hallerian diffidence than he does at present about undertaking operations which may have (and frequently have had) such disastrous results as those for fractures of the limbs. Whether a patient will recover, or whether he will die, after such an operation, cannot always be foretold. A very slight lapse in aseptic technic may prove fatal. At all events, there is often a question whether as good a result might not have been obtained without operation. I often recall in this connection that wise maxim of Heister: *In prædicendis fracturarum eventibus multa utique chirurgis opus est circumspèctione.*

SEQUELAE OF MINOR INJURIES INCOMPLETELY SEVERING NERVES OF THE HAND. THEIR SURGICAL TREATMENT.

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Although the immediate and final results of complete division of the nerves to the hand are so well known that any recapitulation is unnecessary, relatively little attention has been devoted to sequelae of partial severance, anatomical or physiological, of these nerves. That insignificant injuries may produce lesions of the nerves to the hand sufficiently painful and incapacitating to require serious attention does not appear to be generally known. Therefore a number of cases that have come under my observation will be described in some detail. Before doing so, the results of incomplete division of nerves should be described briefly.*

The symptoms and signs of incomplete division of a mixed nerve are similar in essential characteristics, whether the injury is sudden (from a wound), or develops gradually (from cicatrix, callus, etc.), whether the incomplete severance is anatomical or physiological. It was formerly believed that such symptoms were chiefly motor. Sherren and others have shown, however, that sensory changes always occur and that motor manifestations, though generally present, need not necessarily follow.

An area of tactile anesthesia is present almost invariably. Within that zone sensibility to pin prick and temperature is generally deficient; it may be intact, however, in some of the slighter injuries, and I wish to place especial emphasis upon this in view of some of the cases I have encountered. Loss of sensibility to touch may therefore be the only sign of injury to a nerve. However, with pronounced sensory changes there are usually motor alterations. Some or all of the muscles supplied by the affected nerve may be paralyzed more or less completely. It may be impossible to distinguish between complete and partial division of a nerve until one or two weeks have elapsed. At the end of that period, however, muscles supplied by the partially severed nerve do not present the *typical* reaction of degeneration, in contradistinction to that of total division. The mode of recovery after incomplete division is also in striking contrast to that following total division. In the latter, sensibility to

*A fuller and more accurate description is to be found in Lewandowsky's *Handbuch der Neurologie*, Vols. I and II, and in the monograph upon *Injuries of the Nerves and Their Treatment*, by James Sherren. Many of my remarks are based upon these works; it should be stated that my own experience has been the guide in what I have chosen to say upon certain disputed points.

pain returns long before that to touch; in the former, they return about the same time. Generally the return is far more prompt and complete when a nerve is incompletely severed, for evident reasons.

The sequelae of untreated cases of partial nerve division are of interest in connection with those to be described. Pain is more common than after complete severance and is often more severe. It may be so intense that patients are entirely incapacitated from any work. Pain is frequently associated with skin tenderness in the field of distribution of the injured nerve. It rarely appears directly after the trauma, the quiescent period varying from days to weeks; diagnosis of "hysteria" are not infrequently made because this fact is not recognized. Sensibility to pin prick and temperature generally returns more or less completely, even when treatment has not been instituted, but tactile anesthesia remains, in direct proportion to the extent of the injury. No description is necessary of the trophic changes in the skin and nails that may develop.

Concerning the results of operation for incomplete division of the nerves to the hand it may be said that they are generally good, as far as compression of the musculo-spiral nerve is concerned. No general statement concerning partial severance of other nerves of the hand can be made because the reports in the literature are too scanty. This is particularly true of the group of cases of minor injury, the subject of this paper. The results I have obtained by simple operative treatment have been very satisfactory; they will be described in the individual case reports. Before the latter are presented I wish to repeat that incomplete severance of nerves may result not alone from major injuries leaving well-defined traces, but also from traumata so insignificant that patients recall them with difficulty and attach no importance to them. This is the important point to be gained from the perusal of the case reports.

CASE I: Mary S., 18 years old, servant. For six months has had severe pain in the left thumb almost constantly. It began gradually, is steadily growing worse, and is sometimes violent enough to prevent sleep. Objects held in the left hand are occasionally dropped; the patient has accustomed herself to do all carrying with the right hand. Profuse sweating of the skin of the affected thumb.

Examination: Tactile anesthesia over the entire palmar and lateral aspects of the thumb, less extensive on the extensor surface. (See diagram.) It extends over the thenar eminence and is lost shortly above the radial aspect of the wrist. Small area of thermal and pin prick anesthesia on finger pulp. During examination beads of perspiration appeared over the thenar eminence.

Two inches above the wrist, on the radial side

of the flexor surface of the forearm, there is an insignificant, slightly tender short transverse scar. Sensory changes begin shortly below this point. Upon inquiry it was learned that the cicatrix was the result of incision of a small abscess, done about one month before the onset of pain in the thumb.

Diagnosis: Incomplete severance of the radial cutaneous nerve, from an incised wound or from the cicatrix following the abscess.

Operation: Local anesthesia. Vertical incision surrounding scar. This was carefully dissected from the subcutaneous tissues, and found adherent to the radial cutaneous nerve. At the point of attachment the nerve is thickened and firm. About three-eighths of an inch nerve was resected with the cicatrix, and its ends approximated by a single suture; this was covered with a small flap of fat. Suture of wound.

Post-operative course: Prompt relief of pain. Distinct shrinkage of area of tactile anesthesia, after four weeks. Normal sensibility to touch, pain, and temperature, six weeks later, and has so remained to the present time (three years after operation).

CASE II: Jacob S., tailor, 36 years old. Slipped going downstairs and fell upon hypothenar eminence of right hand. For a few days some swelling and tenderness on ulnar side of the wrist and tingling sensations in the little finger. These disappeared and the patient felt well except for some stiffness of the fingers and hand. Pain in the fourth and fifth fingers began about three weeks after the fall. Soon after, weakness in the grasp of the hand was noticed. Pain became progressively more severe and lancinating. The hand gradually became unfit for work, and wasting of thenar and hypothenar eminences were noted. Over this latter pronounced sensitiveness of the skin developed. The man's general condition became seriously undermined. He had been treated for central nervous disease. Wassermann reaction negative.

Examination: Nine months after injury (March 26, 1913). Lesion evidently one involving the ulnar nerve. The skin over the hypothenar eminence and palmar aspect of the little finger is thin and glossy. Both eminences are atrophied moderately; interosseous spaces hollow. Hand grip weakened. Adductor power of thumb markedly diminished. Ability to spread fingers limited. Very pronounced weakness and diminished motion in all the movements of the little finger; to a lesser degree, of the ring finger. No absolute loss of any motion. Tactile anesthesia is a well defined zone over the last two fingers; smaller, ill defined areas of thermal and pain insensibility. (See diagram.) Exquisite tenderness of skin in anesthetic zone. Immediately external to and below the pisiform bone a small area markedly sensitive to pressure; a pea-sized nodule is indistinctly felt here, some distance under the skin. Electrical tests of the affected muscles; no response to interrupted current. Rather sluggish contractions with galvanic current; no "reaction of degeneration."

Diagnosis: Incomplete severance of the ulnar nerve at the pisiform bone, due to pressure. Sec-

ondary inflammatory changes in nerve about the blocked area.

Operation: March, 1913. Curved incision across the wrist. Rather dense scar tissue encountered. Ulnar artery isolated and retracted. Ulnar nerve found free down to a point a little above level of the pisiform. From here to (and slightly including) the division of the nerve into its two branches (the deep and superficial palmar) a quarter inch below the pisiform, the nerve was embedded in inflammatory tissue so dense that its recognition and isolation involved minutest care. When freed the nerve was found compressed; otherwise appeared to be intact. The case seemed one of anatomically disturbed but physiologically blocked conduction. The nerve was covered with sterile vaseline, the scar tissue excised, the wound sutured.

Post-operative course: Prompt disappearance of pain; slight return about three weeks after operation, recurrence lasting several weeks; permanent freedom from pain thereafter. Patient employed electricity and massage very conscientiously, but motor and sensory improvement very slow in first six months after operation. Since then, however, it has been more rapid. Examination, June, 1914: Excellent general condition. No pain. Hand useful for a little work. Tone of skin over thenar and hypothenar eminences much improved. Both are much fuller, less flabby; similar improvement of the interossei. Fair power in spreading fingers, functions of little finger considerably improved, pronounced weakness of adductor power of thumb remains. Area of thermal and pin prick anesthesia gone; that of actile anesthesia much smaller and ill-defined.

In a recent letter (November, 1914) the patient, who lives out of town, writes that there has been steady improvement in range and power of motions, including those of thumb.

CASE III:* Harry J., 12 years old, came under observation in July, 1911, complaining of pain along the radial side of lower left forearm, of one month's duration. It had become steadily worse, sometimes accompanied by pain along the outer side of the upper forearm and arm. At first no history of trauma was given; only after the examination suggested a nerve lesion and the patient and his mother were carefully questioned was it learned that, some time in the early part of May the boy's left forearm was struck by a baseball (in the region now most painful), a black-and-blue spot remaining for several days.

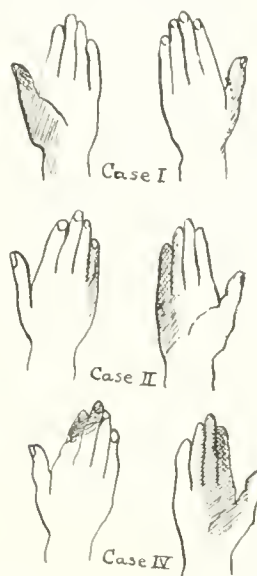
Examination: Area of exquisite skin sensitivity beginning about three inches above wrist and extending in a one-inch strip along radial side of anterior surface of forearm to base of thumb. This zone is somewhat hypersensitive to pin prick; nevertheless there are several small patches of tactile anesthesia within it. Possibly slight alteration in thermal sensibility (examination of this small patient rather difficult). No motor changes.

Diagnosis: Contusion of anterior branch of external cutaneous nerve. Operation advised, not ac-

cepted at first. Patient returned after three weeks complaining of increased pain despite a variety of therapy. No additional findings.

Operation: Vertical incision at upper level of sensitive skin area. No scar tissue encountered. After considerable search the nerve was found. Slightly thicker and firmer than the remainder of the exposed part for a length of one-half inch almost opposite upper level of the sensitive zone. This portion of the nerve resected. No attempt at suturing the divided nerve, because little or no sensory changes result from division of this branch. Wound sutured.

Post-operative course: Pain as severe as that before operation for about one week, and then gradually disappeared. At examination, one month after



Oblique lines indicate areas of tactile anesthesia.
Cross lines indicate areas of thermal and pain anesthesia.

operation, patient entirely free from pain, skin sensitivity gone. Small area of tactile anesthesia immediately below the incision. Patient disappeared from observation soon after, quite well when last seen.

CASE IV: Charles S., 30 years old, chauffeur. Dull, aching, continuous pain in second and third fingers of right hand for two months. These fingers feel numb and there is the same sensation to a lesser degree in the thumb. Motion of the latter have become "clumsy," although there is no great difficulty in gripping and holding the driving wheel. Pain not improved by varied treatment employed, and, although not progressive, is "getting on his nerves." Upon inquiring into the possibility of trauma, it was learned that, about two weeks before the onset of pain, the anterior surface of the right wrist received a sharp blow from the crank-handle when the engine back-fired. The patient placed no significance upon this, but he could not recall any previous injury in that region.

Examination: Very slight atrophy of thenar eminence. Some weakness in power of moving thumb towards and away from the palm. Tactile anesthesia over the palmar surfaces of the index and

*From the Surgical Department of the Mount Sinai Hospital Dispensary.

middle fingers, to a slight extent on the ulnar aspect of the thumb. The zone extends up the radial side of the palm to a short distance below the wrist. (See diagram.) On the dorsal aspect of the fingers, this zone is limited to the two distal phalanges. Area of insensibility to pain and temperature much smaller. A point of moderate tenderness to pressure on the anterior aspect of the wrist, directly internal to the tendon of the palmaris longus. Deep palpation here results in tingling sensations in the radial half of the hand.

Diagnosis: Contusion, incomplete severance of median nerve at the wrist.

Operation: October, 1914. Local anesthesia. Short vertical incision at tender point (the course of the median nerve at the wrist). Thin fibrous tissue over and rather intimately adherent to nerve. When dissected free, median nerve found congested and enlarged in a fusiform manner at the wrist for a distance of about three-eighths of an inch. In order to relieve the evident edematous condition of the nerve, a small incision was made into the sheath and the nerve fibers gently separated by blunt dissection. This resulted in the escape of some clear fluid and distinct reduction in the size of the fusiform swelling. Small strip of subcutaneous fat placed over the nerve, wound sutured.

Post-operative course: Very rapid improvement, beginning soon after operation. Pain disappeared within two weeks, area of tactile anesthesia began to shrink about one week later. At the present time, two months after operation, patient feels he is completely cured; however, some tactile insensibility over index and middle fingers still remains, and full power has not as yet returned to the thumb. At the present rate of improvement the patient should be quite well in a short time.

CASE V: Abraham K., 51 years old, violinist. A small incised wound of palm of left hand, due to broken glass, was treated and healed promptly about two months before he came under my observation. At the time of injury, tingling in the middle and ring fingers for several days, disappeared for about three weeks, then returned. Return accompanied by burning sensations in these fingers which have become progressively more painful. A certain stiffness of the third and fourth fingers and, to a lesser degree, of the adjoining fingers, has developed, so that the patient has experienced "some loss of delicacy of touch in playing the violin."

Examination: Slightly tender, short, transverse scar between heads of third and fourth metacarpal bones, on the left palm. Shooting pains in middle and ring fingers upon pressure over cicatrix. Skin over the adjoining surfaces of these fingers and their palmar surfaces tender to pressure, hypersensitive to pin prick; there appears to be small spots of tactile anesthesia in this hyperalgesic zone. No motor changes.

Diagnosis: Either complete or incomplete division of the palmar digital branch of the median nerve, severe pain suggesting the latter lesion.

Operation: January, 1914. Local anesthesia. Small vertical incision surrounding scar. Latter deeper in subcutaneous tissues than expected. Cicatrix excised.

Search for nerve fruitless. All vestiges of scar tissue removed. Wound sutured.

Post-operative course: Very satisfactory. Pain and paraesthesiae began to clear up soon after operation; stiffness of fingers improved to such an extent in three weeks that patient was able to pursue his professional work with very little discomfort. Examination, two months after operation: Hyperalgesic zone almost gone, a few scattered points remaining; replaced by a zone distinctly hyposensitive to touch and pin prick. About six weeks later, patient reported himself entirely well, but an opportunity for a detailed examination was not obtained.

A number of other instances of injury of the digital nerves has been observed; these were not operated upon, the end-results are unknown, and they will therefore not be reported. However, unoperated cases, observed in the Surgical Department of the Mount Sinai Hospital Dispensary, will be presented because it is of interest in connection with the group of cases under consideration.

CASE VI: Moses C., four years old. Weakness of right hand first observed at age of three. Has been progressive and accompanied by progressive wasting of hand and, to a lesser degree, of forearm. In the beginning frequent complaint of pain in hand and forearm; much less after the first few months. Case appears to have been treated as one of anterior poliomyelitis.

When examination of the arm disclosed a pronounced valgus deformity of the elbow, the mother was questioned about its etiology. She had not noticed it and does not recall any injury. However, when the patient was about two years old, he was treated for "rheumatism" of that joint, the symptoms—pain and swelling—having been of some two weeks' duration.

Examination: Valgus deformity of right elbow not present on left side. A small, firm, slightly tender, subcutaneous mass palpable at inner aspect of right elbow, in the approximate situation of the ulnar nerve. X-ray shows that there had been a supracondylar fracture that healed with considerable deformity of the lower end of the humerus.

Since the outcome of this case is unknown (operation refused and patient disappeared from observation), the detailed neurological examination will not be described. The findings were typically those of incomplete severance of the ulnar nerve at the elbow—impaired power of ulnar flexion and adduction, weakness of the interossei and of adduction of thumb, tactile anesthesia and diminished sensibility to pain in ulnar third of hand.

Those cases have been presented in which my notes are complete and in which the end-results of operation could be determined. Although not numerous, they suffice to demonstrate that the nerves of the hand can be incompletely severed by insignificant traumata; that the evidence of such severance is readily found in a routine examination for a nerve lesion; that the sequelae of such injuries may be serious, and that the results of simple operations are often satisfactory.

1275 MADISON AVENUE.

AMBULANT OTITIC MENINGITIS.*

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There seems to have been but little written on this subject. This statement must serve as my excuse for presenting the following cases, one in the service of Dr. Wendell C. Phillips, at the Manhattan Eye, Ear and Throat Hospital, operated upon and described by Dr. S. J. Kopetzky, and one operated upon by me in the same institution. To these I have added a few unpublished remarks on seventeen similar cases, including three of my own, by Dr. James G. Dwyer.

R. F. Admitted to the service of Dr. Wendell C. Phillips at the Manhattan Eye, Ear and Throat Hospital and operated upon by Dr. Samuel J. Kopetzky.

Patient underwent a simple mastoid operation in the early spring for acute mastoiditis. The wound healed, leaving a persistent post-auricular fistula, for which the patient was readmitted to the hospital on September 4, 1914, for a plastic operation.

The operation consisted in freshening the wound edges and approximating the skin surfaces and holding them in place with metal sutures.

From September 5 to September 9 nothing out of the ordinary was noted. On the tenth some headache was complained of and the temperature rose during the night to 104.6°.

On September 11 a blood culture found negative. Lumbar puncture gave the following:

Physical: Heavy flocculi in clear fluid.

Chemical: Copper reduction present and marked; lactic acid very faint reaction.

Cytology: An occasional lymphocyte present.

Bacterial: Direct smear negative. Culture negative at end of 24 hours.

The temperature ranged between 103° and 105°, with remissions downward. No chills were noted. The pulse remained between 96 and 100, mostly around 80-96. The respirations remained at 24-28.

The only complaint was headache at this time.

On September 15 the abdomen became rigid and there was some stiffness of the back. Widal test negative.

Two hours before the subsequent operations the patient became unconscious.

On September 15 an exploratory operation was undertaken, preceded by lumbar puncture.

The lumbar puncture gave the following results:

Physical: Cloudy fluid.

Chemical: Copper reduction absent; lactic acid present, marked.

Bacterial: Smear revealed streptococci.

The diagnosis of meningitis was thus substantiated.

The exploratory operation showed the following:

Cerebellum explored for abscess and found negative.

Lateral sinus opened and a thrombus found near knee, of small size.

Bleeding obtained from both ends. Jugular therefore not ligated.

Decompression over tegmen and cerebellum.

The patient died September 18. No autopsy.

The case is noteworthy for the following:

1. The failure of the original wound to heal in the normal way after the simple mastoid operation.

2. The patient admitted for a plastic operation and in apparently good health recovers from the effects of this procedure and remains without incident for almost a week.

3. Complaints of headache and gives temperature changes which prompt: (a) Blood examination; (b) cerebrospinal fluid examination; and these examinations fail to show anything out of the normal.

4. Two and a half days later lumbar puncture reveals all the evidence of a fully developed streptococcus infection of the meninges; and the exploratory operation reveals a thrombus.

Comment: The meningitis probably had its origin in the infection of the sinus.

July 24, 1914, Mr. X., a well-nourished, large man, 55, consulted me because of difficulty of hearing and a sense of fullness in his left ear. He claimed to have had almost no illness until the slight attack of grippe that put him to bed for several days about five or six weeks previous to his visit to my office. While convalescing from this attack he had been taken with pain in the left ear, which persisted for four days. As it grew better he noticed a slight discharge.

Examination: There was an inconsiderable amount of secretion in the canal and a slight drooping of the posterior superior wall of the left ear. Pressure by probe revealed that this drooping was evidently caused by an exostosis in the canal wall. There was almost no redness of the drum-membrane, which, however, appeared thickened and slightly bulging with a small nipple-like perforation in the posterior superior segment. No pain on pressure over the mastoid. Temperature 99°. No discharge from the nose, which appeared fairly normal. Hearing distance: Akoumeter, 3 inches. Weber to left. CII fork 25/25.

Under local anesthesia a free paracentesis was performed and hot bichloride of mercury irrigations were ordered. A culture was sent to the laboratory of the Manhattan Eye, Ear and Throat Hospital. On July 27 the report on the culture was "Bacillus mucosus capsulatus of Friedlander." My notes at this visit read: "Patient is feeling considerably better; there is only a slight discharge through the drum-membranes. Temperature normal."

Mr. X. was seen daily until August 4. Each day the temperature was normal. At this time the hearing distance had increased to about 9 inches. The patient claimed that he felt decidedly better and

*Report of Two Cases of Cerebrospinal Meningitis Presenting No Central Nervous Phenomena Until Shortly Before Death." *Transactions American Otological Society*, 1913.

rather objected when I requested him to call the next day.

On August 5 the patient complained of severe pains in the head especially in the vertex. He claimed that he had not slept since two o'clock that morning. Temperature 101.6° . There was absolutely no tenderness about the mastoid and no edema. There was slightly more discharge in the canal. The patient presented an expression of extreme anxiety and looked rather pasty. He was sent to the Manhattan Eye, Ear and Throat Hospital for mastoid operation.

Upon my arrival at the hospital, about two hours later, I found that the pain in the vertex was decidedly worse. The patient complained very bitterly about it. His temperature had risen to 102.5° ; and because of experience in two similar cases I decided to examine the cerebrospinal fluid by means of a lumbar puncture. In spite of the fact that no physical sign or symptom pointed to involvement of the cerebrospinal system, the lumbar puncture (which was performed by Dr. J. G. Dwyer) brought forth a milky-colored fluid under pressure. About 10 c.c. were obtained. A hasty microscopical examination revealed pus.

While this examination was being made by Dr. Dwyer I proceeded to perform the mastoid operation. The mastoid process was small and extensively eburnated, excepting in the region of the sinus where the bone was slightly softened. The sinus was freely uncovered and found to be perfectly normal in appearance. There was also slight softening of the bone in the region of the tegmen, where the dura was freely exposed and found to be of perfectly normal appearance. The antrum was extremely small. It contained pus, but no granulations. The posterior canal wall was removed and an exostosis found on it. The internal ear was not disturbed. The patient's condition was bad; his pulse was very rapid and weak, and it was considered inadvisable to open the dura. Dr. Dwyer injected 45 grains of urotropin into the spinal canal, whereupon the pulse regained considerable of its fullness and regularity.

The following morning the patient complained much of pain in the vertex. Cerebration was somewhat delayed, but his answers were clear, and Kernig and Babinsky tests were negative. His temperature rose to 104° , and that night he gradually went into a state of coma, in which he died on August 7. A post-mortem examination was not allowed. Examination through the wound failed to reveal any abscess in the brain.

Dr. Dwyer's report on the cerebrospinal fluid was as follows:

Physical: A turbid fluid; heavy precipitate upon centrifuging.

Chemical: Copper reduction absent; lactic acid present.

Bacterial: *Bacillus mucosus capsulatus* of Friedlander.

Culture: The same organism.

Cytological: Mainly polymuclear; some large mononuclear.

The case is remarkable because of:

1. The normal temperature for 11 days, *i. e.*, until two days before death.

2. No visible point of entrance of the infection from the middle ear or mastoid.

3. Complete lack of clinical symptoms until the headache and elevation of temperature appeared, only a few hours before the cerebrospinal fluid was found to be milky, indicating either an extremely rapid infection, or that the infection of the meninges had been present a considerable length of time, perhaps days.

Dr. James G. Dwyer allows me to quote from an unpublished paper the following:

"During the past two years there have come under the notice of the writer seventeen cases of meningitis, in which the only method of diagnosis was by lumbar puncture, as none of these cases presented the clinical picture of meningitis so that the diagnosis could not be made by the usual means, that is, the usual clinical means. In many of the cases it was only in the routine bacteriological and cytological examinations that the condition was diagnosed. In most of these cases, as far as could be gleaned from their histories, and as far as could be judged from the cerebrospinal fluid, the meningitis had lasted for as long as two weeks, the patient going about his ordinary business as usual; and it was only when coma or delirium supervened that attention was directed to the meninges. In none of these cases were any of the ordinary symptoms present; the leucocyte and differential count were above the normal, but not like that found in the fulminating or classical type. There were no symptoms of pressure; in short, were it not for the cerebrospinal fluid findings, the patient would seem to be on the road to recovery. It was noted that in some few of the cases operative interference seemed to change the character to a more active form, but this was not always noted, and several of the patients died in full consciousness.

"All of these cases showed capsuled organisms; the majority showed *streptococcus mucosus capsulatus*, and two showed the *bacillus mucosus capsulatus* or Friedlander bacillus. In all, the fluid was very turbid just before death, and in most from the beginning. All of the usual tests—chemical, bacteriological and cytological—were done on these fluids, so that the whole presents a very interesting and instructive picture.

"These cases are reported because it shows the necessity of routine laboratory aids and draws our attention to a particular form of meningitis which, while answering to the general characteristics of meningitis as we know it from the laboratory standpoint, gives us no clue as to the actual condition

present from the clinical standpoint; and the early recognition of this will at least help us in our prognosis if in no other way. It also shows the necessity of cultures being taken in all of our operative cases; and if any of these capsuled organisms are found, our attention will be directed more quickly to any possible complication.

"The question arises, Why do we have this picture with this group of organisms? The answer is hard to find, but we must remember that an organism with a capsule is very highly protected against the action of the anti-bodies, that the capsule acts as a protective wall to the organism and thus hinders to a certain extent the ordinary protective factors."

As I said before the Otological Society two years ago,[†] the only reference I could find in literature to this class of cases is that by Brieger, quoted by Preysing in the *Transaction of the German Otological Association*, 1912; and I take the liberty of again using the same quotation:

"In many cases of suppurative meningitis we see all the symptoms disappear after opening the labyrinth and after repeated lumbar puncture. I have seen such cases, which appeared almost in the last stages, seemingly completely recover. They got up out of bed, walked about, felt perfectly well; and we were astounded to see that within a few hours after a condition of apparent complete well-being, death should supervene. Autopsy revealed that in some cases there occurred in parts of the subarachnoid space, inaccessible to lumbar puncture or to other exploratory methods, a widespread plastic infiltration, while in other cases there existed, in addition to these localized infiltrations, diffuse inflammation of the meninges."

It seems, then, that there is a type of *meningitis purulenta*, which from its complete lack of symptoms is quite distinct from the picture we usually find in the text-books and rarely in the general literature on the subject. If we can accept the term "ambulant typhoid," why not call this "ambulant meningitis"?

These cases teach the necessity for bacterial examination, and accent the fact of the gravity of infections due to capsuled organisms. Headache, though not severe, in the presence of a discharging ear, should excite our gravest fears. Lumbar puncture, though perhaps an admission of weakness of our diagnostic skill, must be resorted to in order to establish a diagnosis; and will prove invaluable in forming a correct prognosis.

35 PARK AVENUE.

TOTAL RHINOPLASTY: A CASE REPORT.

RICHARD H. JOHNSTON, M.D.,

BALTIMORE, MD.

In November, 1913, I was consulted by R. A., 25 years old, native of Canada, who gave the following history: Up to the time of his accident he had been generally healthy. He had had no venereal disease. Three years before I saw him, while working in a saw-mill, he was drawn against the saw in a manner which he could not explain. He thought he was sucked down by the force of the saw. In falling he threw his head to the right, which probably saved his life. The left biceps muscle was removed to the humerus; the nose was

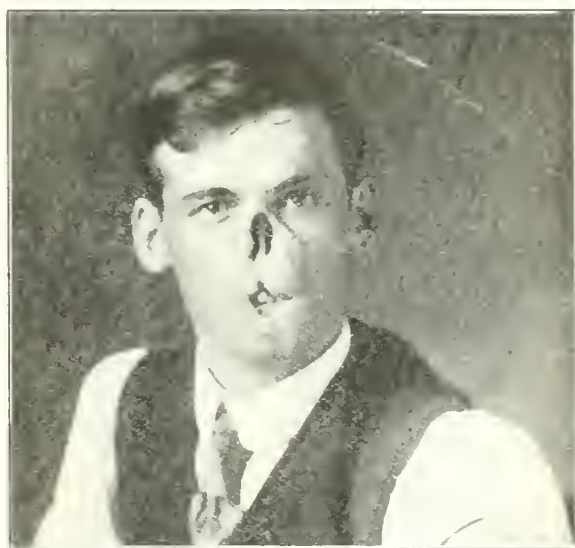


Fig. 1.

cut entirely off, the lower lip was cut off to the lower border of the inferior maxilla, while the upper lip was cut through to the right of the middle line and hung down on the right side. The left upper lip was cut away from the bone, the forehead had several cuts on the left, and the left cheek was cut into ribbons. Unfortunately, the physician who saw him afterwards did not re-attach the nose, although it was found and preserved for some time. He sutured the cheek, forehead, and upper lip. Nothing was done to the lower lip, which was completely cut away, as described. The patient was removed to a hospital, where for a time his condition was critical. After five months he was able to go to his home, where for a year he was practically an invalid. During this time he had no control over his lower lip, so that saliva constantly dribbled from his mouth. After his recovery his appearance prevented his getting a position.

[†]Read before the Eastern Section of the American Laryngological, Rhinological and Otological Society.

When I saw the patient his condition was as follows: The nose was shaved off on the left side even with his cheek, while on the right a slight projection of bone and cartilage could be seen. The mucus membrane of the interior of the nose was exposed, revealing what was left of the bony septum and the inferior and middle turbinated bodies. The mucous membrane still performed its function and preserved its glistening appearance after an exposure to the atmosphere of three years. To hide the deformity the patient wore a gauze shield. The scars in the forehead and cheek were distinct. The left eye could not be entirely closed because of the scar on the upper lid. The lower lip was made up entirely of scar tissue, which was tightly

long, which was pared down to a thickness of 5mm. and notched slightly $\frac{3}{8}$ of an inch from one end. An incision was then made through skin and periosteum a little above the center of the left forehead, 1.2 inches from the middle line. With a sharp elevator the periosteum was raised from the bone and the cartilage slipped underneath it. The skin was then sutured. The transplantation of the cartilage is shown in photograph 2.

In order to allow plenty of time for the cartilage to attach itself to periosteum, the final operation for the restoration of the nose was delayed until March 12, 1914. The first step in the second operation was dissecting up the skin on the two sides of the remains of the nose (Fig. 2). The flaps



Fig. 2. xx—Cartilage under the skin. aaa—Line of on which skin was later dissected up and turned into opening. bbb—Flap for making new nose.

adherent to the bone from the teeth, which were exposed to the mental process. The upper lip showed a hare-lip to the right of the center, exposing the teeth; the scar tissue was not so extensive as in the lower lip. All these lesions are shown in photograph 1.

Because of the numerous scars on the face I proposed to plant a piece of cartilage under the skin of the left forearm and two months later to transplant the flap to the remains of the nose. When I explained to the patient that the arm would have to be held in a cramped position for two or three weeks before cutting the flap away, he refused to submit to it. He insisted that the flap be taken from the forehead, though it would add another scar.

On December 29, 1913, I exposed the left eighth rib and removed a piece of cartilage, 1.3 inches



Fig. 3.

were turned into the facial opening, skin surface down and sutured in the middle line so that the raw surfaces would quickly unite with the raw surfaces to be brought down from the forehead. The skin flaps helped also to form a foundation upon which the new nose was to be built. The flap for the formation of the nose began at the inner end of the right eyebrow and continued up to the hair line and then across the forehead to the end of the transplanted cartilage; from this point it passed downward and inward above the left eyebrow to the root of the nose. The skin was dissected away from the periosteum up to the cartilage, which was removed from the bone with its strip of attached periosteum. The flap was then turned down with raw surface below. The upper end of the cartilage was stitched above to hold it stationary, while below it was bent at the notch referred to above so that the lower end was sutured into an incision of the

upper lip, the nose would project from the face. The flap was split in the middle line up to the cartilage. After this was done the two edges of the flap were sutured to the raw surfaces on the sides. The two lower flaps, formed by splitting the skin to the cartilage, were turned up into the nostrils and held in place by pieces of rubber tubing inserted on each side of the cartilage. The flap from the forehead was made large to allow for shrinkage and because the patient wanted a large nose, which was a family characteristic. The flap was nourished by the bridge of skin left between the eyebrow. The nose was covered with iodoformized gauze held in place with adhesive strips.

The first dressing was made five days later and

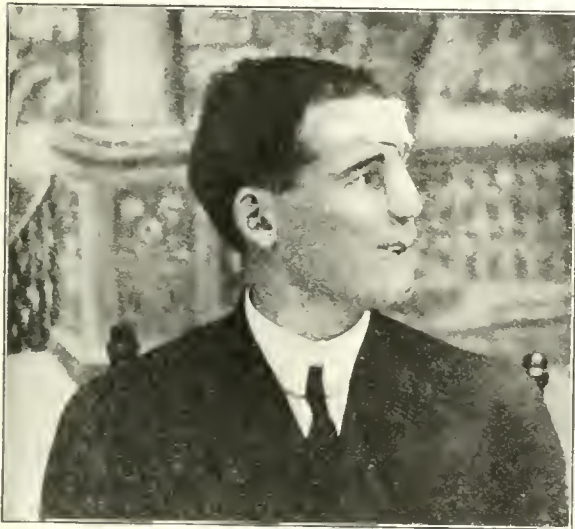


Fig. 4.

the nose was found in good condition with sensation highly developed. The stitches were removed on the twelfth day. On April 28 the wound of the forehead was scraped and covered with Thiersch skin grafts from the inner thigh; two of them took well, but the third sloughed. To build up the lips and to give the patient a mouth with which to eat and to talk properly, many operations were required because of the excessive amount of scar tissue.

The final result of the operations is shown in photographs 3 and 4. While the new nose is by no means perfect, the foundation is such that successful operations to shape it and to reduce its size can be done at any time. After having had no nose for three years, the patient was well satisfied with the result.

807 NORTH CHARLES STREET.

HEMATOMA IN THE FALLOPIAN TUBE WITH PROLONGED UTERINE HEM- ORRHAGE: A CASE REPORT.

E. M. MIERS, M.D.,
HARPER, KANSAS.

Mrs. K., housewife, age 27, entered the Walker Hospital at Anthony, Kansas, December 22, 1914. She had always been well except that she had long had leucorrhea. Soon after her marriage dysuria developed and the leucorrhea increased, staining her clothes. She was married at 19, has two living children. Her father died of apoplexy; the remaining family history is of no interest.

Three years ago she had a miscarriage at seven months; and nine months later another miscarriage at six months. Two years ago she was suddenly seized with pain in the back and lower right iliac region; she began flowing at once, not severely but with small clots and watery blood. She had chills and fever. A physician diagnosed appendicitis. With this attack she was confined to her bed for two days, after which she felt well, but had recurring pains, which she said were like colic, sometimes lasting a minute and at other times an hour. She flowed constantly from this attack to the time of admittance to the hospital, a period of two years, the flow consisting of small black clots, the size of a pea, and watery blood, necessitating her wearing a napkin constantly. At her menstrual periods, which were regular, there was a profuse flow lasting six to nine days, with much pain, with bearing-down sensations.

What was the cause of the hemorrhage? Could this woman have had an extra-uterine pregnancy with hemorrhage from the uterus? The history of the case would indicate this, but the duration of the existing conditions, the constant hemorrhage, and the absence of shock would not support this conclusion. Can we connect the early marital symptoms—increased discharge, dysuria, and dull bearing-down pain—with secondary salpingitis due to gonorrheal infection, which the husband admits having? This would account for the dysmenorrhea and peculiar colicky pain, but what of the hemorrhage? Could the pus cause an erosion of the mucous membrane with oozing hemorrhage in tube and uterus?

Physical examination: A frail, weak, emaciated patient. Two years ago she weighed 118 pounds, now she weighs 83 pounds; pupils widely dilated, reacting to light normally; pulse 132; temperature normal; anxious expression; chest negative; abdomen flat; pain on deep pressure over right iliac low

down; no rigidity; *vaginal examination* showed small clots of blood and watery blood; also purulent mucous exudate; no external tears or abnormality; cervix slightly lacerated, soft and admitting little finger; uterus somewhat enlarged, movable, normal position; left tube and ovary apparently normal. There was a mass in the right side, quite large, movable and not very tender. Abdomen otherwise negative. Urine negative.

In all cases of extra-uterine gestation are found symptoms that simulate normal pregnancy, of which she had none. In ectopic gestation there is usually a history of long standing sterility with manifestations of endometritis, suppressed menses, increase in size of the abdomen and breasts, and digestive disturbances, such as nausea and vomiting, occurring at an early date. There are two signs suggestive of ectopic gestation: "First, bloody discharge; second, peritonitic phenomena." The latter present themselves with pain, more or less sharp, in the lower abdomen, radiating to the loins and back and recurring at every menstrual period, simulating in a degree labor pains, accompanied by enlargement of the abdomen, very sensitive to pressure and requiring the patient to go to bed. The bloody discharge is often accompanied by expulsion of the decidua in part or complete. This condition is often diagnosed miscarriage. A tumor situated on either side of the uterus, or posteriorly, is only pathognomic of tubal gestation when accompanied by sharp, colicky, localized, recurrent pain, history of sterility, signs of pregnancy, and—if ruptured—by the usual signs of hemorrhage, with faintness and rapid pulse. This simulates our case if we disregard the long duration of the symptoms, although I cannot tell the length of time this mass had existed. The history would lead one to suspect ectopic gestation from the start.

I operated December 26. Opening the abdomen revealed considerable free fluid—bloody serum with clots in Douglas' cul-de-sac. The left ovary and tube were normal; the right tube was sausage-shaped, five inches long, and of a diameter about that of a silver dollar. The tube was ruptured on the upper surface near the fimbriated extremity, and contained a large black clot of blood. The right ovary was cystic and contained a hematoma. Tube and ovary were removed. The patient made a good recovery, and all symptoms disappeared.

Probably this was a case of ectopic gestation with expulsion of the decidua and fetus either through the uterus or into the peritoneal cavity with absorption; at any rate, no trace of them was found. I think, however, that we cannot exclude the possi-

bility that salpingitis might have caused an erosion of the mucous membrane, producing an oozing hemorrhage and formation of clots.

THE MISUSE OF THE CATHETER IN CORRECTING OSSICULAR RIGIDITY.

An experience of years with catheter-inflation has convinced me that the frequent routine use of the catheter *as a means of correcting ossicular rigidity* is based on a false conception of the mechanism involved. The theory on which it is used is, of course, obvious, viz., that the act of inflation moves the drum membrane and with it the ossicles, thereby tending to restore their normal mobility. The beginner in otology is often enthusiastic over the distinct functional gain following a first or second inflation, and is at a loss to explain his failure by the same means to obtain continued and progressive improvement of hearing. The explanation of this phenomenon is that the first few inflations in the case of an individual whose ears have not been under recent treatment often do result in the breaking or at least modifying of small intratympanic adhesions, with consequent improvement of sound transmission. If continued as a routine measure the force of the inflations are exerted more and more in the direction of stretching the drum membrane while exerting progressively less influence on the ossicular chain. Used too frequently or too forcibly, and continued over a considerable period of time, the net result is a disturbance of the tone or balance of the conducting mechanism far outweighing the influence of the comparatively small movements of the ossicular chain.—PHILIP KERRISON in *The J. A. M. A.*

RENAL INFECTION.

In the hyperacute and even in many of the acute and chronic cases of renal infection, the local signs are often completely masked by the general symptoms of septic intoxication or by the even more common fact of the patient's referring all the symptoms to the bladder; and thus those who do not know some of the multicolored garments under which renal infection disguises itself are apt to overlook the golden period at which the kidney itself, the real seat of the trouble, might receive aid and thus avert either complete destruction of the organ of one side, or prevent the spread of the infection to the other.—D. N. EISENDRATH in the *Interstate Medical Journal*.

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WALTER M. BRICKNER, M.D., Editor

NEW YORK, APRIL, 1915.

SIMPLE METHODS OF BLOOD TRANSFUSION.

The transfusion of blood has been amply established in therapeutic value in a variety of conditions; and yet, because of the technical difficulties in the operation that have heretofore obtained, the procedure has not come into that general employment which its often life-saving service deserves. Technically, the easiest method of transferring the blood was, until recently, the syringe method of Lindeman. But that, too, is very far from simple; it requires a very nice technic, trained assistants, and numerous expensive, easily-broken syringes. Without very great care the cannulae, frequently handled and pushed and pulled upon by the syringes, are apt to become dislodged; and clotting in syringe or cannula is often the experience of the inexperienced.

Recently Lester J. Unger, an interne in Mt. Sinai Hospital, New York, has greatly simplified the syringe transfusion method, reducing the number of syringes to two, obviating the handling of the cannulae, and so accelerating the procedure that a thousand cubic centimeters of blood can readily be transferred in five minutes. To accomplish this he uses a double two-way stop-cock.

As described by him in the *Journal of the American Medical Association*, February 13, 1915, "it is a stop-cock, which alternately connects a syringe for blood to the donor and at the same time a syringe with saline to the recipient; then by turning the cock the syringe with blood is immediately con-

nected to the recipient and the syringe with saline to the donor."

The 20 c.c. syringe for aspirating and injecting the blood fits directly into an opening in the small current-directing mechanism; the recipient's and donor's cannulae and the syringe for saline solution (a single barrellful is sufficient for the transfusion) are connected with this switching mechanism by paraffined rubber tubes. It will be readily seen that the employment of this apparatus, which requires no special skill, is vastly simpler than transfusion by the method of Lindeman or by the anastomosing of blood-vessels with sutures (Carrel), or special cannulae (Crile, Elsberg, Soresi).

But in order that the transfusion of blood may be employed whenever and wherever emergencies may require it, it must be possible not only without any special skill, but also without any special apparatus. In other words, it must be as readily performable as an intravenous saline infusion, the few paraphernalia for which are everywhere easily procurable. That transfusion may be reduced to the same simple procedure as infusion, it is only necessary to keep the blood fluid. To accomplish this defibrination has been employed, which, however, deprives the blood of important constituents. The search for a safe anticoagulant therefore suggested itself. Leech extract (hirudin) is too toxic if mixed in sufficient amount to prevent clotting of the whole blood used (Satterlee and Hooker used it in small amounts to prevent clotting in syringes). Sodium citrate, much used in laboratory tests as an anticoagulant, was found safe in the necessary amount (0.02%) by Hustin of Brussels, who reported (*Annales et Bulletin de la Société Royale des Sciences Médicales*, May, 1914) the successful injection into a patient of blood mixed with a solution of sodium citrate and glucose.

Without knowledge of Hustin's work or of each other's, two New York investigators, Richard Weil and Richard Lewisohn, also, and simultaneously, arrived at the employment of sodium citrate as the means of simplifying transfusion by maintaining the fluidity of the blood. They both found, too, that, curiously enough, the sodium citrate introduced with the donor's into the recipient's blood does not reduce the coagulability of the latter (which would be a serious objection in many cases) but actually increases it.

Weil reported (*Journal of the American Medical Association*, January 30, 1915) the syringe injection into human patients of small amounts of blood (10 to 350 c.c.) kept fluid, in an ice-box, by a 1% admixture of sodium citrate.

Lewisohn went further. He transfused larger amounts (1,000 to 1,200 c.c.) of fresh blood mixed with a solution of sodium citrate to form a 0.2% dilution of the latter, which, like Hustin, he found by experiment sufficient to keep the blood fluid 48 hours or more. Lewisohn's method is exceedingly simple, obviating even the use of syringes. As described in the *Medical Record*, January 23, 1915, he allows the blood to run from the donor's vein through an ordinary cannula or large needle into a glass jar, containing five c.c. of 10% sodium citrate solution. While the blood is running into the jar it is stirred with a glass rod to effect a good mixture of blood and citrate solution. The blood is then poured into an ordinary glass funnel or salvasan jar which is connected by a piece of rubber tubing with the cannula or needle in the recipient's vein. Surely a simple method of transfusion—quite as simple as, if not more simple than, the intravenous injection of salvasan.

Accumulating experience has thus far shown no danger in the use of citrate blood and it appears to be quite as effectual as unmixed blood. In addition to its great simplicity, the transfusion of citrated blood has the advantage over Crile's method that, like Lindeman's and Unger's, the amount of blood introduced can be accurately measured, and it has the further advantage over all these methods that it can be conducted leisurely and without the simultaneous presence of donor and donee—indeed, the blood can be carried from the donor's home to the patient's.

It is interesting to note that there has appeared another claimant for honors in the transfusion of citrated blood. In the *Medical Record*, February 27, 1915, G. A. Rueck of New York says that he conceived the idea in January, 1914, and carried it out experimentally on rabbits in that month, and in May, 1914, injected a patient with 250 c.c. of a blood-saline solution—sodium citrate mixture. On these accounts he "claims to be the originator of this method of blood transfusion"—which quite ignores Hustin (another indignity to Belgium!)

Blood transfusion has at last been transformed from a tedious, delicate, and often difficult surgical operation to a simple procedure that can be conducted almost anywhere and by any physician.

With Unger's apparatus unmixed blood can be readily and quickly transferred from one person to another. Without that, or any special apparatus, citrated blood, which appears to be equally serviceable, can be transferred by the method of Lewisohn—to date the simplest of all transfusion procedures.—W. M. B.

Surgical Suggestions

Do not be hasty in urging operation for exophthalmic goiter. Even bad cases sometimes recover completely under conservative treatment.

When cough, emaciation, fever, and hemoptysis are not associated with tubercle bacilli in the sputum, consider neoplasm of the lung. Metastatic sarcoma of the lung may give the same physical signs of localized tuberculosis.

In all varieties of acute tubal and adnexal infection radical operation is often unnecessary and undesirable. Many so-called "pus-tubes" get well without operation or subside into a chronic state.

Pure forward subluxation of the head of the humerus can occur from mild violence and it is one of the occasional causes of shoulder disability. It is reduced by abduction, and continuous abduction for two weeks will cure it.

Keeping tally of the pads and sponges used and discarded during a laparotomy puts a serious responsibility and a great strain upon the nurses and always carries the chance of an error in calculation. Moreover, if a sponge or pad is unaccounted for it entails a manual search among the patient's viscera and in the pile of discards. It is simpler and safer to leave no untaped sponge entirely within the cavity, even for a brief period, and to use as pads and packings only those that are long enough to so far protrude from the wound that they cannot be lost.

The following is a very simple and often surprisingly effective method of securing abduction in the treatment of shoulder disability: In a semi-recumbent position in bed the patient abducts his arm on the pillow as much as he comfortably can. A bandage sling is looped lightly about the wrist or the elbow at one end and tied to the head of the bed at the other. The head of the bed is then raised on chairs. As the patient gradually slides down, the arm travels (relatively) up alongside his head. By this means persistent and marked abduction disability is sometimes cured in twenty-four hours.

Surgical Sociology

Ira S. Wile, M. D., Department Editor.

CANCER AND THE SIMPLE LIFE.

The ravages of cancer continue to excite interest and research while the death rate apparently continues to advance. During 1913, cancer and other malignant tumors caused 49,928 deaths in the registration area, corresponding to the death rate of 78.9 per hundred thousand population. The rapidity with which the mortality rate from this disease has increased is well evidenced by the fact that the death rate per hundred thousand population in 1900 was only 63. It is undoubtedly true that a considerable proportion of this increase is due to improvement in diagnostic methods and more frequent operations with the definite diagnosis established on the operating table.

When it is appreciated that since 1900 the death rate from tuberculosis of all forms has decreased from 201.9 to 147.6 in 1913, while the typhoid mortality has fallen during the same period of time from 35.9 to 17.9, it is patent that some unusual process is developing in the community making for a higher mortality from malignant diseases, while infectious diseases are apparently coming under the control of modern sanitary science.

The general attitude towards carcinoma has been to recognize it as a surgical condition demanding prompt attention, and stress has been placed upon the importance and necessity of early diagnosis. Bulkley, in his recent book on Cancer, registers his objections to considering malignant tumors as surgical conditions and indicates that inadequate attention has been given to the medical considerations involved before and after operation. It is timely to draw attention to the fact that operations merely remove the results of the disease and that the application of the x-ray, radium, caustics, and various other procedures fails to reach the root of the difficulty.

It is true that traumatism is not the whole cause of cancer, and that its parasitic origin has not been demonstrated. The definite place of heredity and occupation in the etiology of cancer has not been ascertained. Similarly, it is true that carcinoma is not limited to the aged nor does it spend its effects upon any particular sex, race, or class of persons, nor in any particular section of the world.

In view of the negative results which thus far have attended our researches, Bulkley arrives at the conclusion that deranged metabolism is "the only possible etiological element."

It may be true that the incidence of cancer appear to increase along the line of modern civilization, but it does not necessarily follow that there is any distinct relation between our civilization and cancer growth. The facts that living conditions are more complex, that the consumption of coffee, meat, and alcoholic beverages appears to be increasing, and that living is more of a nerve strain than in pre-

vious decades, hardly suffice to indicate a casual relation. It might be equally true that the incidence of cancer has increased in direct proportion with the increase of the wheat crop or the production of gold.

The dangers of argument by post hoc are everywhere recognized. It is possible that as great errors may be committed in judging modern living conditions to be the cause of cancer as in the ancient view that malaria was merely a form of paludism or yellow fever was caused by vitiated air.

In the United States economic conditions vary considerably and standards of living must naturally be altered by the degree of prosperity. The stress and strains of living will vary in different States of the Union according to the industries employing the bulk of the population. Similarly, the relative differences between living in cities and rural sections ought to evidence some relation to the cancer mortality providing the incidence of cancer is largely dependent upon the conditions under which people live.

In considering the cancer mortality rate of the United States the only really significant fact evidenced is that it appears to be lower among the colored people than among the white. For example, the death rate from cancer in 1913 for the registration area was 78.9, but for the whites it was 80 and for the colored 57.3. Contrasting the cities in the registration areas, the total mortality rate was 87.8, for the whites 88.4 and colored 72.9. In the rural parts of the registration States the total mortality 69.4, for the whites 70.7 and for the colored 42.2. Here is an opportunity for bio-chemistry to investigate the differences between the white and the colored which induces a possibly greater immunity on the part of the colored people.

From these same figures, it is also significant that the mortality rate from cancer appears to be higher both for the white and colored population in cities than in rural parts of registration States. This need not necessarily indicate, however, that the complex living of the city is responsible for the higher mortality rate from cancer or that it possesses any specific casual relation to it. The relative mortality in urban districts as compared to rural districts holds true for all causes of mortality and is particularly noticeable in such diseases as measles, scarlet fever, diphtheria, tuberculosis, rheumatism, meningitis, bronchitis, diarrhea, appendicitis, hernia, cirrhosis of the liver, Bright's disease, puerperal fever, congenital debility, and even suicide. It is, therefore, suggestive that, while the rural sections of the community apparently possess a lower mortality rate for many diseases, the underlying conditions incident to this fact are general in their nature and in no wise specifically related to any single disease.

Bulkley makes the following statement: "The simple life, with the avoidance of the dietetic and other causes which have been found to induce cancer in nations and individuals, promises the best hope for the arrest of the rapidly increasing development of cancer throughout the world." While it is undoubtedly true that the return to the simple

life might cause a decrease in many of the diseases due to dietetic irregularities and metabolic inactivities, it still remains to be shown that this simplicity of living will decrease the cancer morbidity more than that of any other cause of death.

Until the cause of tuberculosis was demonstrated, heredity was held to be as important a factor in its etiology as unsanitary living conditions. When modern science eventually discovers the causative factor of cancer, it will be possible to decrease the morbidity which will lead to a fall in the mortality rate. Until such an epoch-making discovery is achieved, early diagnosis and prompt surgical attention is the most satisfactory procedure for attacking the huge problem. It may be true that fully ninety per cent. of those who have once been affected with cancer die of it. It is also indubitable that the general mortality rate from this disease is increasing despite of our surgery, but longer periods of life are granted to those who submit to the early operations than would be possible without such operative procedures.

It is most reasonable to believe that various forms of medical and dietetic treatment, now empirical in nature, may have a distinct influence upon carcinoma. If abstinence from meat or a full vegetarian diet is productive of a greater resistance to carcinoma, a most interesting field of investigation is open in order to ascertain the reason for the increased resistance to the disease. Until, however, some direct causal relation is demonstrated between diet and cancer, communities are safer in clinging to the belief that immediate surgery is of greater value than experimentation with variable systems of dietetics. Modern surgery is a palliative of cancer, occasionally a cure for cancer, and may be in a few selected instances a preventive of cancer, although the last is never susceptible of proof.

Book Reviews

Obstetric Nursing. A Manual for Nurses and Students and Practitioners of Medicine. By CHARLES SUMMER BACON, Ph.B., M.D., Professor of Obstetrics, University of Illinois and the Chicago Polyclinic. Duodecimo; 355 pages; 123 illustrations. Philadelphia and New York: LEA & FEBIGER, 1915.

It is a pleasure to have read this book. The reviewer knows no book in the English language dealing with this subject that has so much received the personal touch of the author. The title of the book is very modest. While primarily written for nurses, it is safe to say that all physicians may read it with a great deal of profit to themselves and not a little benefit to the patient. The three opening chapters deal with the duties of the nurse to herself, to the physician, and to the patient. The advice given cannot fail to improve the efficiency of the average nurse. The entire domain of obstetrics is covered from the viewpoint of caring for the obstetric patient and her infant. While an exhaustive description is not given of the physiology, the pathology, and operative technique, the book is nevertheless complete in important practical detail. The little work breathes cleanliness; it savors of the spirit of Oliver Wendell Holmes and clean obstetric nursing.

A Student's Manual of Gynecology. By JOHN OSBORN POLAK, M.Sc., M.D., F.A.C.S., Professor of Obstetrics and Gynecology, Long Island Medical College. Duodecimo; 414 pages; 100 engravings and 9 colored plates. Philadelphia and New York: LEA & FEBIGER, 1915. Cloth, \$3.00 net.

For students who desire to get the outlines of gynecology briefly and tersely stated and at the same time to become conversant with most of the items of gynecologic disease, the little volume of Polak's is capital. The author's large experience is boiled down into exceedingly compact chapters; diagnostic hints and surgical indications are stated in the clearest and most practical terms. Illustrations are particularly descriptive of operative procedures. The book's chief virtue is clearness; students are not apt to be puzzled about the conditions described; its fault lies in the rather false impression it may give students that pathology is a finished subject of which all the facts are cut and dried and finally established.

Selected Addresses on Subjects Relating to Education, Biography, Travel, etc. By JAMES TYSON, M.D., LL.D., Professor of Medicine, Emeritus, University of Pennsylvania. Duodecimo; 358 pages. Philadelphia: P. BLAKISTON'S SON & CO., 1914.

The essays reprinted in this volume cover a wide range. Without carrying any large message or distinguished by unusual depth of thought, they afford pleasant and wholesome reading. The style is simple and unpretentious. We noted one or two mistakes. On page 335, the date of the discovery of the spirocheta pallida is given as 1884 instead of 1904. Also on page 326 Ross—and not Reed—is mentioned as one of the discoverers of the mosquito etiology of yellow fever.

The Heart in Early Life. By G. A. SUTHERLAND, M.D., F.R.C.P.; Senior Physician to the Hampstead and North West London Hospital; Physician to Paddington Green Children's Hospital. Duodecimo; 207 pages. London: HENRY FROWDE, OXFORD UNIVERSITY PRESS; LLODGER AND STOUGHTON, 1914.

Sutherland divides his work into three main parts: 1. Functional cardiac disturbances. 2. Paroxysmal tachycardia. 3. Organic heart disease. It is in the first part that we must seek whatever justification the special title of the book holds, for the reason that most of the functional disturbances that affect hearts occur in the young. The author discusses the various forms of arrhythmia, tachycardia and bradycardia. We had expected an extended discussion of congenital heart disease, but this subject, except in relation to certain murmurs, is strangely missing. In the chapter upon the uses of digitalis, the indications are not given with sufficient precision. There is also no mention of the now comparatively common form of heart disease, the subacute infectious variety or endocarditis lenta; nor is there any mention of the common cardiac disturbances in the young associated with orthostatic albuminuria. The discussion of the subject is on broad lines and is tempered with sound judgment. The exposition is thoroughly modern and is based largely upon the work of Mackenzie and his pupils.

The Difficulties and Emergencies of Obstetric Practice. By COMYNS BERKELEY and VICTOR BONNEY. 2nd Edition. Octavo; 807 pages; 302 illustrations. Philadelphia: P. BLAKISTON'S SON & CO., 1915. Price \$7.50.

This book was reviewed in these columns about a year ago. We were then glad to recommend it. The second revised edition is heartily welcome. Apart from its lucid style and completeness, it is invaluable as an expression of a very large personal experience of the two authors.

The Philosophy of Radio-Activity or Selective Involution. By EUGENE COLEMAN SAVIDGE, M.D., New York. Octavo; 151 pages. New York: THE WILLIAM R. JENKINS COMPANY, 1914. Price \$1.50.

The book treats radio-activity not in the sense commonly understood by medical men, but rather in a broad, com-

parative, philosophic way. For the student of philosophy the book should prove of interest. For the average medical practitioner and even x-ray specialist it will be of slight, if any, practical value.

Books Received

The Cancer Problem. By WILLIAM SEAMAN BAINBRIDGE, A.M., ScD., M.D.; Professor of Surgery, New York Polyclinic Medical School and Hospital; Surgeon, New York Skin and Cancer Hospital, etc., etc. Octavo; 534 pages; illustrated. New York: THE MACMILLAN CO., 1914. Price, \$4.00, net.

Abdominal Operations. By SIR BERKELEY MOYNIHAN, M.S. (London), F.R.C.S., Leeds, England. *Third Edition.* In two large octavo volumes, illustrated. Philadelphia and London: W. B. SAUNDERS CO., 1914.

A Medical Dictionary for Nurses. Giving the Definition, Pronunciation, and Derivation of Terms used in Medicine, together with Supplementary Tables of Weights, Measures, and Chemical Symbols, etc., Arranged with Special Reference to Use by Nurses. By AMY ELIZABETH POPE, Graduate of School of Nursing of the Presbyterian Hospital, New York; Special Diploma, Teachers College, Columbia University; formerly Instructor in the School of Nursing, Presbyterian Hospital; Instructor in the School of Nursing, St. Luke's Hospital, San Francisco, etc. Duodecimo; 288 pages. New York and London: G. P. PUTNAM'S SONS, 1914. Price, \$1.00, net.

International Clinic Week at the N. Y. Polyclinic Medical School and Hospital, during the International Surgical Congress, April, 1914. Pamphlet, 103 pages.

A Nursing Manual for Nurses and Nursing Orderlies. By DUNCAN C. L. FITZWILLIAMS, M.D., CH.M., F.R.C.S., Surgeon in Charge of Out-Patients and Lecturer in Clinical Surgery, St. Mary's Hospital, London, etc. Duodecimo; 466 pages; illustrated. London: OXFORD UNIVERSITY PRESS, 1914. Price \$2.50.

Progress in Surgery

A Résumé of Recent Literature.

Report of a Case of Ununited Fracture of the Tibia Repaired by Bone Grafting. PRESCOTT LE BRETON, Buffalo. *Buffalo Medical Journal*, January, 1915.

Le Breton reports an interesting case in which a fracture of the right tibia, a little below the knee joint, was sustained by a child three weeks old, the parts remaining ununited until, at the age of seven years, perfect union was secured by bone grafting. When the child began to walk, the lower leg was bowed, and on weight bearing there was so marked a give "as to remind one of congenital hip dislocation." There was also shortening and atrophy.

An incision was made over the fracture; the ends were cleared of the dense fibrous tissue, and the long end of the upper fragment was cut off and removed. Two canals were chiselled out above and below for a bone transplant. Then, with an electric saw, graft of suitable size was removed from the opposite tibia, fitted into the right tibia, and retained by kangaroo tendon and chromic catgut. A plaster cast with the knee in considerable flexion kept the fragments in line. In eight weeks, union was firm and walking allowed. An osteotomy done to the lower part of the same bone corrected the lower bow leg. The child has now a perfectly straight leg. The sole of the shoe is increased to make up for the shortening.

Prevalent Fallacies Concerning Subacromial Bursitis. Its Pathogenesis and Rational Operative Treatment. WALTER M. BRICKNER, New York. *American Journal of the Medical Sciences*, March, 1915.

Brickner refutes the current misconceptions concerning subacromial bursitis, and sets forth his conclusions, based on the careful study and treatment of a large number of cases, that: there is no diagnostic point of tenderness; usually little or no swelling; the shadow seen radiographically is due, *not* to thickening of the bursal wall, but to a calcareous deposit found in or on the supraspinatus or infraspinatus tendon, and therefore beneath, *never within* the bursa; not only is the removal of the bursa unnecessary, but its complete excision, as some books recommend, is impossible without mutilating dissection; subacromial bursitis is traumatic, resulting from the bruising of the bursa and the underlying tendon, by external violence or, more often, by an unduly vigorous active or passive abduction of the arm; it does not arise from bacterial or toxic irritation.

The calcareous deposit appears early, even in a few days after trauma. Whether seen early or late, within or upon the tendon, it may be semi-fluid or solid, small or large, single or multiple. It does not come from the bone.

He then describes the technic of the operation he employs, which experience has shown him to be the "surest means of early cure." The patient has been placed partly on his side with a cushion under the affected shoulder. From the outer border of the acromion downward over the greater tuberosity, a two and one-half or three-inch vertical incision is made, exposing the deltoid muscle, which, having been split, is retracted. This discloses the roof of the bursa, which is drawn up with forceps away from the floor, and incised, and retracted, exposing the interior of the sac. After all adhesions have been divided, the bursa is explored with the curved scissors and the finger, while the arm is manipulated if necessary. Next the bursal floor is incised in the same line, and dissected up from the supraspinatus tendon. If a deposit is thus found it is removed with a blunt spoon. The tendon then usually reveals a small transverse tear, within which is more of the deposit. Should no extratendinous deposit be found, the supraspinatus tendon is opened axially at the site indicated by the radiograph and the deposit is scooped out. In either case, frayed edges of tendon and adhering granules of lime are removed, and the tendon wound sutured with vertical or transverse chromicized catgut stitches, according as the deposit is extra or intratendinous. If the deposit is not found in the supraspinatus tendon, it is removed from the infraspinatus tendon.

The arm is dressed in abduction of about 120° in light plaster-of-Paris bandage, and remains so until the first dressing—about eight days. The post-operative treatment consists in abducting the arm, especially at night, and exercises, gentle at first, but increasing in vigor about the third week, as necessity dictates. The restoration to full function varies in time, depending on how long the patient has been suffering from the malady, previous to operation.

Fixation of Simple Fractures. JOHN O'CONOR, Buenos Ayres. *Annals of Surgery*, January, 1915.

From an experience of thirty years of active surgical practice O'Conor sounds a strong note against early ambulatory treatment, with passive motion and massage instituted soon after bones are fractured. In his opinion at least thirty days of complete immobilization are necessary for an adult's fractured long bone to heal. Early massage, though of value to diminish pain and swelling, brings with it the danger of displacements and a greater number of cases of ununited fractures. Consequently, the author employs massage only after four weeks have passed from the date of injury, *i.e.*, when union is established.

His practice is to wait even where interposing "foreign bodies" prevent union; after four weeks he exposes the site of fracture, removes intervening structures, revivifies the fragments and then plates. Lane plating has proved very gratifying in its results in his hands; he has never observed loosening of the screws or displacement of the plate. The approximation accomplished he always sutures the divided periosteum over the fracture. The wound is

then sutured securely. Extension apparatus is interdicted; instead, the splints are carefully adjusted from time to time; on the forty-second day the splints are removed and massage commenced. At the end of six weeks the plate is removed.

The Treatment of Gun-shot Fractures of the Femur.
(*Zur Behandlung der Schussfrakturen des Oberschenkels.*) E. SUCHANEK, Vienna. *Wiener Klinische Wochenschrift*, January 14, 1915.

In von Eiselsberg's clinic, the leg is placed in the so-called Florschütz position, i. e., the leg is suspended from a bar that hangs over the bed, while extension is carried out by means of weights as in the Buck method. When weight extension is of no avail, the author cordially commends the Steinmann method—driving a nail through the condyles and applying extension directly from the nail. He does not approve of the use of plaster of Paris in gunshot fractures, because of the frequency of infection of the wound.

A New Type of Ankle Fracture. F. J. COTTON, Boston. *Journal American Medical Association*, January 23, 1915.

Cotton describes a fracture of the ankle which he thinks is commonly overlooked, though it must have been seen by almost everyone. The characteristic point of the fracture under consideration is backward dislocation with the splitting away of a wedge, large or small, from the back surface of the tibia at the joint—a wedge that is displaced backward with backward dislocation of the foot. This wedge carries the posterior tibio-astragaloid ligaments; foot and tibial fragment move together up and backward. The malleoli are also fractured, usually not unlike that in Pott's fracture, though sometimes the internal malleolus and the posterior tibial edge of the joint are included in one piece that is split away in a spiral line. As a rule, however, that posterior tibial fragment is separate, though association with fracture of both malleoli. It has long been recognized that certain cases of Pott's fracture—so-called—were complicated with backward luxation of the foot, but what has not been recognized is that nearly all these cases are not Pott's fractures at all. In all the cases of ankle fracture that Cotton has had in the past seven years there was only one in which the fracture lesion here described was not present—only one case of real posterior dislocation with Pott's fracture. He is not sure that this type of fracture is not more frequent than the inversion Pott's type, and any attempt to treat it like a Pott's fracture is liable to end in disaster. If the foot and leg rest on the heel the tendency is toward spontaneous reduction, but this occurs only in some of the cases and in many it resists even a considerable force directed toward its reduction. If it is unreduced such a case must end in a new joint between the tibia and the forward slant or neck of the astragalus, with limited dorsal flexion and without precise support at the sides. A twist is usually given as the cause of the injury. Reduction is simple if the lesion is understood. All that is called for is forward traction with the muscles relaxed in moderate plantar flexion; reduce so and then lock the reduction in maximum dorsal flexion; hold in plaster.

The End-Results of Treatment of One Hundred Cases of Fracture of the Elbow; Immobilization in Hyperflexion Combined with Early Passive Movements and Massage. HAROLD NEUHOFF and HEINRICH FRANZ WOLF, New York. *Surgery, Gynecology and Obstetrics*, March, 1915.

In a consideration of one hundred cases of fracture of the elbow referred to the authors in their dispensary classes they found that best results were obtained in those cases that presented themselves for treatment within the shortest period after fracture. They aimed at a standard in end result defined and upheld by Ashhurst, viz.: "by a 'perfect result' we mean one in which the full and normal range of motion is the sequel of the treatment of a fracture of the elbow. Anything short of this is termed an 'imperfect result'." With this high standard before them,

Neuhof and Wolf discovered that the patients finally discharged with a perfect result had appeared for treatment at periods averaging 12.8 days after fracture, while in those patients discharged with an imperfect result the average period before treatment was begun had been 32.1 days after fracture.

They used hyperflexion in immobilization, not merely acute flexion, but the most acute flexion in which the elbow could be fixed without obliterating the radial pulse—the angle of flexion produced varied between 20 and 35 degrees. In recent fractures this extreme flexion was obtained without difficulty.

As soon as possible after immobilization massage was instituted; the gentlest kind of massage—mere stroking for 10 to 25 minutes at the beginning, gradually making the treatment more vigorous. After each treatment the elbow should always be replaced in hyperflexion. From the very outset active and passive motions should be started in the hand and shoulder.

The Radical Removal of the Verumontanum, with Notes on Pathology. A. G. RYTINA, Baltimore. *Journal American Medical Association*, January 2, 1915.

Rytina describes his technic of the operation for the removal of the verumontanum, which can be performed, he claims, with less risk of subsequent complication than the use of the cautery and the application of strong silver nitrate commonly used. The description of the technic requires the illustrations to make it perfectly clear. The operation is radical, he says, and, in allowing the removal of the almost intact verumontanum, enables us to make accurate pathologic studies, with the result that a more rational interpretation of the symptomatology and therapy may be anticipated. Of course, the operation should only be carried out in specially selected cases. He describes the anatomy and histology of the parts and of the sinus penularis, which his studies show is a long canal lined by a many layered, squamous epithelium ending in the substance of the verumontanum by a complicated system of invaginated processes. The structure is clearly favorable for retention products and suggests difficulty in eradicating infection, which is the sole cause, as far as seen by him, of pathologic conditions of the verumontanum. His conclusions are as follows: "1. Colliculectomy is a simple operation for removal of the verumontanum. It is less liable to untoward complications and sequelae than strong applications of silver nitrate or the thermocautery. 2. The study of the pathology of the verumontanum is made easy, in consequence of which a therapy will be devised that will be based on science, rather than on empiricism. 3. Surface applications of mild antiseptic solutions seem to be rational. Strong penetrative cauterant substances may have great therapeutic value in curing infections, but may do more harm than good, on account of the production of untoward complications or sequelae. 4. A straight-beaked colliculectome lends itself to removal of vegetation and polypi from any part of the anterior urethra."

Studies in Obscure Forms of Prostatic Obstruction and Vesical Atony. BRANSFORD LEWIS, St. Louis, Mo. *Annals of Surgery*, March, 1915.

Upon a correct understanding of the exact causation of urinary obstruction and its cognate, vesical atony, depend the treatment and prognosis of the case. Lewis holds there is no such thing as "unaccountable atony" or urinary retention, nor such a thing as "incurable atony" except when caused by some nerve-degenerative process as tabes; these terms are unjustifiable since they represent an incomplete diagnosis.

Before adopting a plan of treatment the exact cause of the malady should be sought; this will always fall within one of two groups of causes, viz.: (1) physical obstructions, or (2) disturbances of nervous mechanism controlling urination. For cases in the second group much can be done locally and internally to facilitate urination; for cases in the first group the physical obstruction must be removed before the expulsive forces become restored. Not infrequently syphilis is the underlying cause of the urinary

retention, and here Wassermann blood and spinal fluid tests are imperative. A contracture of the vesical neck (at times demonstrable only through the opened bladder or urethra) may also act as an underlying, unrecognized cause of bladder atony with urine retention. Furthermore, these conditions often go undiagnosed in early age, from infancy up, and early and correct recognition of such cases offers the best likelihood for proper treatment before they grow hopeless.

Urinary Catalase in Health and Disease. By MAX KAHN and CHARLES J. BRIM, New York. *American Journal of Obstetrics*, January, 1915.

The authors find from a number of examinations that catalase is found in traces in normal urine that has been freshly voided. In urines which contain blood, bile and acetone, the catalase content is usually high. Cases of lymphosarcoma and Hodgkin's disease show a high catalase content and patients suffering from diabetes with acidosis eliminate largely increased amounts of catalase; diabetes without acetonuria, however, have normal amounts.

Observation of Torsion of Ovarian Cysts with Report of Cases. By K. I. SANES, Pittsburgh. *American Journal of Obstetrics*, January, 1915.

In reporting nine cases of this disorder, Sanes says the differential diagnosis lies between pelvic inflammation, inflammation of the cyst, gall-bladder or kidney colic, ruptured ectopic gestation, appendicitis with or without pregnancy and perforation of a hollow viscus. The diagnosis is simple if the pain and tenderness are localized over the tumor, the presence of which was known to the patient. In a stout patient with rigid abdomen, anesthesia may be necessary before a diagnosis can be made. After the acute stage is passed, the diagnosis will be easier, as the mass can be more definitely outlined. A history of frequent attacks of pain out of proportion to the low pulse and temperature is a valuable diagnostic aid.

The Roentgen Diagnosis of Gall Stones by Improved Methods. LEWIS GREGORY COLE, New York, and ARIAL W. GEORGE, Boston. *Boston Medical and Surgical Journal*, March 4, 1915.

These authors maintain that they have detected gall-stones roentgenologically in about fifty per cent. of cases they have examined. This improvement they attribute to (a) a special technic for making the roentgen plates, using the Coolidge tube; (b) a careful study of these plates particularly superimposing one plate over another so as to match together the several shadows of the gall-bladder region; (c) skilful interpretation, which comes from a thorough intimacy with the x-ray appearance of gall-stones. Where there is no direct x-ray evidence of gall-stones they advise examination of stomach, cap, duodenum, and colon for adhesions, accompanying a cholecystitis. Where no roentgen-ray evidence of cholelithiasis is present, the authors suggest that operative procedure is warranted only when the clinical history is characteristic and not merely suspicious, as is so frequently the case.

Pylorotomy and Partial Gastrectomy or Excision of the Ulcer-Bearing Area in the Treatment of Gastric Ulcer. WILLIAM L. RODMAN, Philadelphia. *Surgery, Gynecology and Obstetrics*, January, 1915.

Pylorotomy is the operation of choice if the ulcer is situated at or near the pylorus, twice the majority of ulcers are thus situated. Hemorrhage, perforation and cancer are thus frequent results of gastro-enterostomy, that gastro-enterostomy is an inadequate operation. Though more radical and slightly more dangerous, excision and pylorotomy are more beneficial. If the pylorus and the proximal portion of the duodenum are not easily mobilizable, however, a simple gastro-enterostomy should be done. The pylorotomy may be performed in two stages if it should seem desirable for the patient's safety. Because ulcers are so frequently multiple, the more radical measure should be preferred. Ulcers away from the pyloric end should preferably be treated by gastrectomy or removal

of the ulcerated area. Simple excision should be the operation of choice, and this may be supplemented by a gastrojejunostomy.

Experiments in the Transplantation of Gastric Mucous Membrane. WILL DOOLIN, Dublin. *Surgery, Gynecology and Obstetrics*, January, 1915.

Doolin's experiments show that the autoplasmic transplantation of gastric mucous membrane in dogs is feasible and leads to definite cyst formation. The cysts arise from epithelial islets which survive the general necrosis of the graft which depends for its blood-supply upon adhering omentum. Tubular grafts of hollow abdominal mucosal tissue depend for their success upon their muscularis, the canal being later lined with epithelium growing in from the surroundings.

Boiling Water Injections Into the Thyroid Gland for Hyperthyroidism. MILES F. PORTER, Fort Wayne. *Surgery, Gynecology and Obstetrics*, January, 1915.

Porter believes that the injection of boiling water into the enlarged gland should take the place of medical treatment in patients with small thyroids and moderate symptoms of hyperthyroidism. The method is peculiarly valuable in those patients in whom a lobectomy has been done and who are still suffering from symptoms of hyperthyroidism with hypertrophy of the remaining lobe. Patients with large goiters and with pronounced symptoms should be so treated until they can be safely operated upon. The injections are not recommended in non-toxic cases as thyroidectomy is then the procedure of choice. The examination of specimens treated by injections of boiling water and subsequently removed shows connective tissue proliferation in the gland.

Goiter in Children. COLEMAN G. BUFORD, Chicago. *Surgery, Gynecology and Obstetrics*, January, 1915.

Buford says that goiter in children is common in Chicago, occurring in certain districts and appearing most often when certain sewage-impregnated waters are used for drinking purposes, which he believes is the cause of the disorder. He also thinks it likely that focal infections from the tonsils, adenoids or teeth may supply the excess of bacteria ingested and produce goiter singly or in conjunction with the water supply. Theoretically, the thyroid gland is an agent for the destruction of bacteria and it enlarges under these conditions or it elaborates a product to destroy the bacteria or their toxins. When the work of the gland is excessive, it enlarges through hypertrophy; when compensation is incomplete or the dose is continuously large or toxic, constitutional damage results. In the cases of children, spontaneous cure is often seen. The recognition of goiter in children is very important for with diligent supervision and treatment future deformities and ill-health may be avoided.

A Consideration of the Various Methods of Blood Transfusion and its Value. JOHN A. HARTWELL, New York City. *New York State Journal of Medicine*, November, 1914.

The transfusion of blood is a homologous transplantation of tissue. It represents neither a physical nor a chemical mixture. It is indicated best of all in real bleeding, i.e., ectopic, ruptured ulcer, injury, etc., next in anemias, whether primary or secondary, lastly in toxic conditions, metabolic or bacterial. Transfusion shows its greatest usefulness in repleting loss of blood in conditions where the underlying cause of hemorrhage can be remedied; in the other instances transfusion has but a passing value.

The method that followed Carrel, artery to vein and more recently vein to vein, is still in vogue. Here there is always present the danger of clotting, nor can the exact amount of transferred blood be figured; besides, the method is limited to those of specified skill, and is accompanied by discomfort for the patient, the donor, and the surgeon often.

Lindemann's method is an improvement. He uses many (about twenty-five) 20 c.c. Record syringes kept constantly

washed and immersed in saline by an assistant. A special nest of three canule is employed, the outer one being rounded on the end to avoid injury to the intima in transferring the syringes, one after the other, from donor's to recipient's canula; 800 to 1,000 c.c. of blood can thus be transferred in ten to twelve minutes. This method is excellent in many hands.

Best of all is a method devised by Satterlee and Hooker. It is based on the old principle of intermediary tubes which were paraffined formerly and often not free from errors in technique. Satterlee and Hooker, however, introduce an outside canula into the donor's vein exposed by a small incision—a smaller canula, paraffine coated, is passed for a farther distance into the vein away from the site of injury, thereby avoiding disintegration of the thromboplastic substances in the formed blood elements. The blood now passes into a receptacle where coagulation is prevented by the presence of 2 c.c. of a 1 to 500 saline solution of hirudin representing 0.004 gms., an amount sufficient to keep the blood in the 220 c.c. receptacle fluid for 20 minutes. This blood is then injected into the recipient. Hartwell claims that this last procedure is in all respects an ideal one.

Observations on the Treatment of Tetanus with Subcutaneous Injections of Magnesium. (*Einige Beobachtungen bei Behandlung von Tetanus-Verwundeten mit Subkutanen Magnesiuminjektionen.*) A. FALK, Berlin, *Deutsche Medizinische Wochenschrift*, October 29, 1914.

Falk employed 2 to 3 c.c.m. of novocaine (1%) at the site of injection before introducing the magnesium sulphate solution, and so produced no pain. He used a 30% solution, giving 5 to 12 gms. as one dose, repeating this about three times within twenty-four hours; where necessary, i.e., in very severe cases, large doses were imperative. In no instance were any ill-effects observed. In fact, small doses caused irritative phenomena with spasms that were exaggerated and increased in frequency.

Choral and morphin were of essential help—the author states these drugs did not slow or labor respirations while the magnesium injections were used. They did allay tetanic attacks. Falk reports good results for this treatment as employed by himself and many colleagues.

The Treatment of Chronic Leg Ulcers. H. D. SONNENSCHEIN, *New York Medical Journal*, December 19, 1914.

The author reports excellent results by baking the leg in an electric dry air oven at a temperature of 250° to 300° for a period of twenty minutes to one-half an hour, depending upon the case and the patient. The number of treatments averages three a week.

Sulphurous Acid in the Treatment of Furuncles. P. G. SKILLERN, Philadelphia, *New York Medical Journal*, December 19, 1914.

Skillern recommends the internal administration of sulphurous acid in doses of a teaspoonful, well diluted, three daily. The duration of the boil is shortened, and in a series of thirty to fifty cases the author has never seen a recurrence.

The Fulguration Treatment of Certain New Growths. A. F. TYLER, Omaha, *The Urologic and Cutaneous Review*, December, 1914.

Fulguration implies the use of a high voltage, high frequency electric current so produced as to yield a high amperage. Such a current can cause cauterization and has advantages over ordinary surgical treatment in that there is no scar formation in the tissues treated, there is no danger of opening adjoining blood and lymph vessels, there is possible exact regulation of the dosage of the effect required. The method of treatment has particular value in dealing with growths of the face. Tyler obtained excellent results with fulguration, treating keratosis and epithelionia of the lip, also fibroid and sarcoma conditions.

The apparatus is not formidable, is simple to operate, and is not very expensive.

Cancer of the Breast. W. SAMPSON HANDLEY, London, *Surgery, Gynecology and Obstetrics*, January, 1915.

Discussing the theory of the permeation of cancer from the operative standpoint, the author says that the area which demands widest removal is that in which the growing edge is situated, that is, the deep fascia in which is found the lymphatic plexus which forms the highway for the spread of the disease. The area of deep fascia removed must be roughly circular in outline, since permeation spreads with approximate equality in all directions from the primary growth, which must be the center of the area of fascia removed. The skin and muscles are not involved to the same extent as the fascia, but the invaded regional lymphatic glands must be removed.

Some Observations Upon Primary New Growths of the Mediastinum, From a Study of Sixty Cases. J. N. MACBEAN ROSS, London; *Edinburgh Medical Journal*, December, 1914.

From an analysis of sixty cases the author draws the following conclusions:

Malignant disease of the mediastinum is not so rare as is generally believed, whereas innocent tumors of the mediastinum are exceedingly infrequent. It is essentially a disease of early middle life, but may occur at any age. It seems to be increasing in frequency. It is twice as common in males as in females. A definite tuberculous history is often found. Though tubercle bacilli are rarely present in the sputum, there is possibly some relationship between tuberculous and malignant disease. The anterior mediastinum is the usual seat of illness. Sarcoma, usually lympho-sarcoma, is the commonest form of tumor. Carcinoma is relatively more common in females. The lungs are practically always affected, sooner or later, and pulmonary symptoms are usually present. The right lung is more often affected than the left. Extra thoracic metastases are common. The persistent absence of tubercle bacilli from the sputum, in a case suggesting pulmonary tuberculosis is suggestive. Hemoptysis, though moderately common, is rarely severe. A pleural effusion is often present, and often hemorrhagic. Microscopic examination of the fluid is rarely of diagnostic significance.

Banti's Disease; Report on Operative Cases. JOSEPH SAILER, Philadelphia, *The Pennsylvania Medical Journal*, November, 1914.

Sailer describes in detail three cases of Banti's disease which had been treated by splenectomy. Two of the three recovered, but the third succumbed three days after operation, which was performed when the patient was in an extremely anemic condition, owing to recent hemorrhages. The author believes that splenectomy is the treatment of choice, but that as the operation is one of great severity, it should not be performed unless the patient has been put into good condition by medical treatment. One of the three reported cases is of interest in that it ran a very short course—two and a half years, and that the patient suffered attacks of great pain due to hemorrhages in the gastro-intestinal tract and in the kidney. The author believes that in his cases syphilis could be absolutely excluded.

Extirpation of the Spleen for Pernicious Anemia. (*Mils Extirpation bei perniziöser Anämie.*) N. v. JAGIC, Vienna, *Wiener Klinische Wochenschrift*, November 26, 1914.

Jagic reports three cases. In all there was considerable symptomatic improvement, although the blood picture had not altered. The author believes that removal of the spleen eliminates only one of the causes of pernicious anemia. He believes that the constantly present atrophy of the gastric mucosa is one of the important primary foci of the disease, and that therefore removal of the spleen alone cannot effect a cure. He does not deny the possibility that part of the improvement noted in his cases was due to a remission, an incident notorious in this malady.

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OIL-ETHER COLONIC ANESTHESIA.

JAMES TAYLOR GWATHMEY, M.D.,
NEW YORK.

Rectal anesthesia was of little practical value until Cunningham of Boston used air as a vehicle for the introduction of the ether vapor, and it is almost unnecessary to state that the original work of Cunningham and Sutton's improved technic and careful record of cases were most important factors in the development of oil-ether colonic anesthesia.

PHYSIOLOGICAL EFFECTS OF OIL-ETHER COLONIC ANESTHESIA ON THE ORGANISM.

In a very short time after entering the rectum the oil-ether mixture becomes heated to body temperature. As this occurs some of the ether leaves the oil in the form of gas and is absorbed by the blood circulating in the small capillaries surrounding the colon, and thence into the greater circulation. It then passes through the lungs, where part of it is excreted and lost, the remainder is immediately reabsorbed and thus reaches the brain. Blood pressure remains constant.

As a large quantity of the vapor is lost by exhalation the *brain* is never as deeply narcotized as when routine inhalation methods of anesthesia are used. Sensory paralysis of the extremities is first produced with this method and the higher centers of the brain are the least affected. In recovery from anesthesia consciousness is regained long before sensations of pain are manifested.

Although the reflexes are active there is a great degree of relaxation throughout the *muscular system*.

Four factors acting in harmony tend to automatically maintain an even plane of anesthesia: (1) the *constant rate of evaporation* of the ether from the oil; (2) the *distension of the colon*, for when the colon is distended less ether is absorbed than when it is only partially distended; (3) as the ether leaves the oil both the *mixture* and the *gut* are *cooled*, which retards elimination and absorption; and (4) the difference between the *absorptive power* of the *colon* and the *eliminative capacity* of the *lungs*.

INDICATIONS AND CONTRAINDICATIONS.

Oil-ether colonic anesthesia is indicated in (1) neurotics and cases in which fear is pronounced, as in goiter; (2) obese individuals with narrowed air passages; (3) for *bronchoscopy*, *gastrosocopy*, and all operations upon the *respiratory tract*, *head*, *neck* and *chest*.

The technic is contraindicated in cases (1) in which ether is contraindicated, except when the patient has been ill from a previous etherization; (2) *colitis*, *hemorrhoids*, *fistulae* and other pathological conditions of the lower bowel; (3) when considerable rectal pain is caused by the introduction of the solution.

AFTER-EFFECTS.

The after-effects are reduced to a minimum and compare most favorably with the post-anesthetic sequelae following routine methods of administering ether or chloroform. The method has been used to anesthetize consumptives, asthmatics and patients afflicted with bronchitis, and in no instance has the previous condition of the patients been made worse.

THE TECHNIC OF ADMINISTRATION.

The patient. The administration of oil-ether colonic anesthesia is best accomplished with the patient in the *Sims position in his own bed*. If the patient is in a ward, the *bed should be screened*. Exposure of the patient may be avoided by introducing the rectal tube between two suitably adjusted sheets. The patient should be kept very quiet and should never be left alone at any time after having received the injection.

Apparatus. The only apparatus required consists of a special rectal tube $\frac{1}{4}$ inch in diameter and about 28 inches long; a clamp for this tube; a 3-inch funnel into which to pour the mixture and a Gwathmey tube about 30 inches long and $\frac{3}{8}$ inch in diameter. These should be sterilized before use.

Preliminary treatment. Give a cathartic of castor oil the night preceding the operation. Avoid purging. Follow this in the morning by warm water enemas, one hour apart, until the return is clear. Then allow the patient to rest for 2 or 3 hours.

(1) *One hour* before operation give slowly per rectum, with the patient in the Sims position,

Chloretone 5 to 20 gr.
Oil-Ether Mixture, aa..... 2 to 4 dr.

The chlorotone may be given separately in a suppository, or some other hypnotic of equal value may be used.

(2) *Half an hour* before operation give by hypodermic injection,

Morphin $\frac{1}{8}$ to $\frac{1}{4}$ gr.
Atropin $\frac{1}{150}$ to $\frac{1}{100}$ gr.

Instead of the above, in alcoholics or athletes, *two hours before operation* give $\frac{1}{100}$ gr. of hyoscine hydrobromid hypodermatically and *one hour* before the operation repeat the hyoscine with $\frac{1}{4}$ gr. morphin, omitting the rectal preliminary.

No preliminary medication is needed for children under 9 years of age.

Induction. Twenty minutes before the operation administer the oil-ether mixture very gradually, one ounce per minute, through the funnel attached to the catheter, which has been well lubricated and inserted 4 inches within the rectum.

- (1) Mixture for adults:
Olive Oil 2 oz
Ether 6 oz
- (2) Mixture for weak, anemic patients:
Olive Oil 45 to 25 per cent
Ether 55 to 65 per cent.
- (3) Mixture for children:
Ether-Oil, aa 50 per cent.

approaches the danger zone, as indicated by the *loss of the lid reflex, slight cyanosis or stertor*, withdraw 2 or 3 ounces of the mixture remaining in the colon. If this is insufficient, introduce a Connell breathing tube to lighten the anesthesia, or transfuse 1,000 to 2,000 c.c. of normal saline solution intravenously. If *respiratory arrest* occurs, place a bag filled one-third full of carbon dioxid over the face and use artificial respiration. If narcosis is too light, a towel placed over the face and slightly puckered just above the nose and mouth, but held securely to the face around the edges, will deepen it.

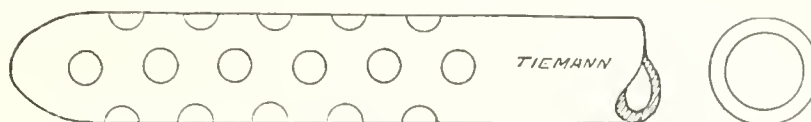


FIG. 189.—GWATHMEY RECTAL IRRIGATION TUBE.

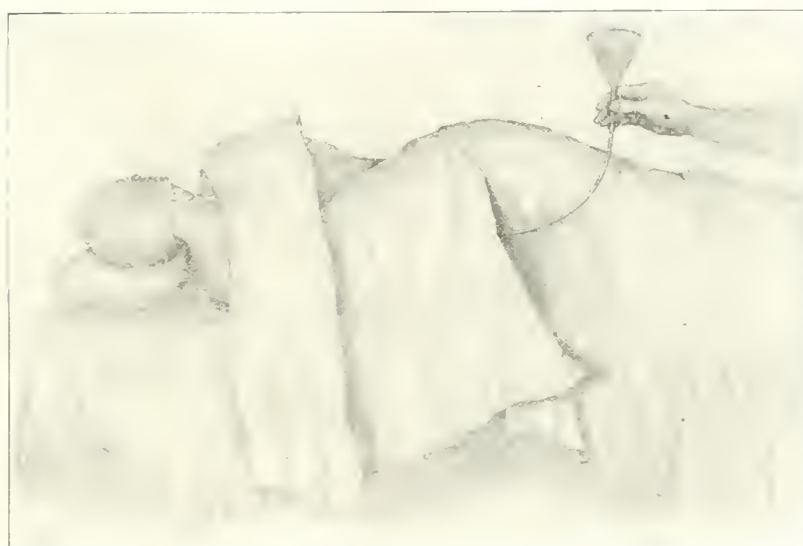


FIG. 181A.—SHOWING PATIENT IN POSITION FOR OIL-ETHER RECTAL IRRIGATION.

Introduce one ounce of the oil-ether mixture for every 20 pounds of body weight, except for obese persons. Eight ounces of a 75 per cent. mixture will maintain anesthesia from 2½ to 3 hours. *No more than 8 ounces should ever be given.* If the patient goes to sleep before the required amount has been given, stop! If narcosis is much delayed, a few whiffs of chloroform may be used.

Keep an unobstructed airway at all times by manipulating the jaw as in inhalation anesthesia, and by preventing the head falling forward or sideways, or the tongue dropping back, thereby cutting off the air supply.

Maintaining surgical anesthesia. In surgical narcosis *breathing is quiet and regular*; the reflexes are active and the pulse normal. If the patient ap-

AFTER-TREATMENT.

At the conclusion of the operation irrigate the rectum immediately with cold soap-suds and at the same time massage the colon gently from right to left in order to expel any liquid that may remain. Withdraw one tube. Introduce 2 to 4 ounces of olive oil and 1 pint to 1 quart of water and withdraw the remaining tube from the rectum.

THE LATEST TECHNIC.

Recently by using paraldehyde as the preliminary, the necessary amount of oil-ether mixture has been reduced one-third to one-half.

Preliminary medication. Administer per rectum, one hour before operation,

Morphin. Alk.	½ gr.
Paraldehyde	1 dr.
Oil-Ether, aa.	¾ dr.

Induction. With this preliminary follow the previously indicated technic, except that, instead of a hypodermic, this dose *should be repeated for alcoholics*, athletes and patients weighing over 160 pounds. Routine cases require no further preliminary medication. In administering the 75 per cent. oil-ether mixture, use one ounce to every 40 pounds of body weight. One drachm of paraldehyde used in this way seems to be equivalent to 2 ounces of the 75 per cent. oil-ether mixture.

ADVANTAGES.

(1) Oil-ether colonic anesthesia can be administered to patients in bed, without their knowledge, thus fulfilling many principles of anoci-association as enunciated by Crile. (2) The apprehension caused by placing a mask over the face, as in inhalation anesthesia, is avoided. (3) The apparatus required is inexpensive and the simplicity of the technic enables the anesthetist to devote his entire time to the patient. (4) The plane of anesthesia is completely under the control of the anesthetist at all times. Any error in judgment may be quickly rectified by the addition or withdrawal of the mixture. (5) Narcosis is automatically maintained at a level plane of surgical narcosis. (6) In over 95 per cent. of cases there is no eructation of gas during anesthesia. (7) With normal patients such complications as colitis, bloody stools or blood streaked returns do not occur. Oil-ether apparently is much less irritating to the colonic mucus membrane than ether vapor is to the mucus membrane of the respiratory passages. (8) Hypersecretion of mucus and saliva are absent and the patient's stomach and lungs are spared. (9) Post-operative vomiting, nausea and gas pains are reduced to a negligible minimum. (10) The patient recovers consciousness in an analgesic state. (11) The limits of safety are extended on account of the gradual and equal absorption of ether from the colon and its rapid elimination from the lungs. The factor of safety is further emphasized by the fact that Dr. W. H. Park, Director of the Bureau of Laboratories of the Department of Health of the City of New York, has found that the oil-ether mixture of 75 per cent. kills the colon bacillus in one minute, while the 50 per cent. solution kills the bacillus in 10 minutes. As the colon bacillus is an important infective agent, post-operatively, the oil-ether solution acts as a desirable prophylactic against possible infection.

In conclusion it may be stated that the principal factor of safety is the wide margin between the

dosage requisite for surgical narcosis and that which precipitates toxemia.

ABSTRACT OF DISCUSSION.

Dr. J. E. Lombard, New York: From an experience of 80 cases I have found that a thorough mixing of the oil and ether by shaking them in a closed bottle best control rectal irritation and too rapid absorption. Chloratone does not seem to obviate reflex symptoms during the injection. Children are not as satisfactory subjects as adults. Preliminaries should be personally supervised, and when possible evacuations in the sitting posture greatly facilitate the cleansing of the lower bowel.

During the injection of the oil and ether it is not necessary to introduce the catheter more than three inches or hold the funnel more than one foot above the level of the rectum. Constant and firm pressure over the rectum until the patient is completely anesthetized is a technical detail of importance. Also patients should not be moved from bed until ready for operation.

A minimal amount of supplementary narcosis may be required in a small proportion of cases. The technic is particularly adapted to "stealing the thyroid," and is especially valuable in bronchoscopy and operations about the head, neck and chest. The time required for thorough preparation, the prolonged stage of post-operative narcosis, and the contraindication of the method in irritative lesions of the rectum are disadvantages. The technic is available, however, for the extremely nervous and insane. Also during its conduct there is no tendency to hypersecretion of mucus, and respiration and pulse are not pronouncedly affected. Hemorrhage is less and there is a decreased tax on the heart, lungs and kidneys.

While not prepared to consider the method fool-proof, nevertheless, having tried it in 80 cases for 15 different surgeons, I am willing to advocate its use in appropriate cases. The Gwathmey method is far superior to all previous methods of colonic anesthesia in its results and freedom from complications.

R. S. Morton, New York: Speaking as a surgeon, after a trial of oil-ether colonic anesthesia in 15 abdominal sections at the New York Polyclinic Hospital, I am rather optimistic about the method, especially because patients accept this form of anesthesia far more readily than inhalation narcosis, and more especially because they seem to have no recollection of having been operated on, and post-operative complications such as pain, nausea and vomiting are almost entirely obviated. While the obtunding of post-operative pain may be in a measure due to the preliminary administration of morphine and chloratone, I believe that oil-ether colonic anesthesia has a peculiar desensitizing effect on the abdominal viscera, and is also greatly responsible for the pain-free period after operation lasting from four to sixteen hours.

The integrity of the bowel is in no way affected. None of my cases developed symptoms of irritation of the colon and gas distress presented in only one patient with angulations of the intestines. Respiration, pulse and temperature, taken before, during and at periods after operation, showed markedly less alterations than under routine methods of inhalation narcosis. Kidney function is not materially affected.

Dr. H. Arrowsmith, Brooklyn, N. Y.: Colonic oil-ether anesthesia is really an "epoch-making" discovery in the evolution of narcosis, particularly as applied to the domain of oral, laryngeal and border-line surgery. Laryngological colleagues are finding the method of especial value in bronchoscopic and esophagoscopy cases, where the extraction of foreign bodies is concerned, for the operator may go ahead with his work, uninterruptedly, regardless of the anesthetist and without the annoyance, at critical junctures, of a partial return to consciousness of the patient, which may mean failure of the operative procedure. The method offers a safe, uniform surgical plane of narcosis that persists, with little or no participation on the part of the anesthetist, for two hours. I have employed the technic in cleft palate operations, resections of the jaw and nasal bones, in extensive attacks on the accessory sinuses, laryngostomies and endolaryngeal operations

with the suspension laryngoscope. One of my confreres uses it, by preference, for submucous resection of the septum.

While the skill of Dr. A. F. Erdman made previous methods of rectal ether vaporization satisfactory for operative procedure about the head, face and neck, these older technics cannot compare in efficiency, safety or ease of administration with that developed by Dr. Gwathmey.

Dr. Cattle: During the past two months I have supervised the administration of oil-ether colonic anesthesia to 38 children, ranging in age from $2\frac{1}{2}$ to 11 years, for tonsil and adenoid operations. Fear and struggling, so common under inhalation methods, were entirely obviated, as the attending nurse handled the preliminary treatment. In the older children $\frac{1}{8}$ gr. of morphine was given by mouth one hour before operation and chlorotone, 5 gr., by rectum, immediately preceding the oil-ether. Patients became anesthetized in from 10 to 20 minutes. Supplementary etherization was necessary by inhalation in only one instance, and in another case the onset of anesthesia was delayed for 40 minutes owing to poor preparation of the lower bowel.

Dr. Schmidt, Atlantic City: The elimination of the element of fear is the greatest asset of oil-ether colonic anesthesia. The method was satisfactory in 13 cases coming under my personal observation, and there were no bad results following. In only one instance was it necessary to administer a few drops of chloroform to secure greater relaxation of the abdominal musculature. When the indications for its use are more fully understood, this method of Dr. Gwathmey will be more generally used.

Dr. Dye: After an experience with this method in 29 cases, I can corroborate the results secured and observed by those who have participated in this discussion.

Dr. C. K. Teter, Cleveland: In closing the discussion, I would ask Dr. Gwathmey to indicate whether various positions of the patient under anesthesia such as the Trendelenburg, or the head-up postures, affect the depth of oil-ether colonic anesthesia?

Dr. J. T. Gwathmey (closing): In my experience the posture of the patient does not seem to affect the depth of anesthesia by the oil-ether colonic method. Absorption does not seem to vary much in respect to the rectum or descending colon. It is a pleasure to realize that expert anesthetists are taking up oil-ether colonic anesthesia as an available method for certain operative procedure, and the exchange of experiences and the grouping of results will serve to perfect the method.

40 EAST FORTY-FIRST STREET.

RESUSCITATION IN THREATENED FATALITIES DURING NARCOSIS OF GENERAL ANESTHETIC AGENTS.*

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The more definite knowledge now possessed as to the causation of death from general anesthetic agents renders it easy, in experimental work, to recognize the physiological defaults involved in its occurrence. In clinical practice the problem is not so simple, since pathological complications frequently are combined with the physiological to obscure the interpretation. For clearness in discussion it is well to class the various factors in anesthetic fatalities into groups, such as the follow-

ing: (1) syncope; (2) excessive intoxication; (3) shock; (4) pathological states and various accidental circumstances.

It is not uncommon in prolonged, or such operations as are known to cause more rapid circulatory depression, to find that shock and excessive intoxication together contribute to the depression. Shock, too, may be precipitated by pathological states, such as status lymphaticus, and by accidental circumstances such as excessive hemorrhage. Also syncope, although usually operating alone, is usually the culmination of an overwhelming toxemia.

Syncopal cases may be divided into dangerous and non-dangerous types. Concerning the latter it is unnecessary to say more than that the patient's face becomes pale, the pulse either much reduced in rate or volume and tension. Such cases recover upon withdrawal of the anesthetic agent. In the more dangerous forms of syncope the pulse and circulation cease abruptly, with consequent facial pallor and widely dilated pupils. Respiration is usually embarrassed, or ceases at the same time as the circulation. Such syncopal attacks usually occur during the induction of narcosis, or just after, although reflex syncope can occur at any later period during the maintenance of anesthesia.

The physiological factors concerned in the causation of syncope are the combined exaltation of excitability of the cardio-inhibitory and arterio-dilator mechanisms. The heart is inhibited and the arteries are relaxed. Whether the heart can release itself from the inhibition and the circulation become restored depends upon the degree of myocardial depression suffered, or otherwise upon the remaining degree of responsivity to stimuli, and possibly upon the extent of the compensatory rise of venous pressure. This rise of venous pressure is inversely proportional to the degree of general intoxication. The respiration fails mostly from bulbar anemia, and to a lesser extent from the anesthetic toxemia. Hence this form of circulatory failure is not paralytic, but rather the result of exalted excitability of the nervous mechanisms mentioned.

The circulatory failure due to excessive intoxication differs sharply from syncope in being essentially paralytic. The cardio-vascular musculature is paralyzed, and the central nervous system is greatly depressed. This form occurs experimentally when the vagi are divided and the anesthetic agent is delivered by artificial respiration. Clinically its occurrence is very rare, owing to the fact that further accessions to the tension of the anesthetic agent already in the blood are shut off by the failure of respiration before the circulation ceases. Artificial

*Read before The British Association for the Advancement of Science, Melbourne, 1914.

respiration lowers this tension and restores the normal gaseous interchange. Cardiac inhibition due to excessive anesthetic intoxication usually occurs later in the course of the administration and its onset is less sudden than that of syncope. The color leaves the face more slowly, the pulse diminishes in volume and tension, but the rate remains practically unaltered during the progressive fall in blood pressure, unless associated with shock, in which instance the pulse rate increases proportionally with the degree of shock or the rate may be retarded or arrested by the onset of cardiac inhibition, the excitability of the vagi being exalted by the low blood pressure as well as by the anesthetic agent.

Levy has shown that ventricular fibrillation occurs when sufficient adrenalin is added to the blood during experiments under chloroform narcosis. Sudden heart block has also been observed in cats during chloroform narcosis, without the addition of adrenalin; but the vagal form of cardiac arrest occurs more commonly during experimental narcosis with chloroform on dogs. Corresponding retardation in pulse rate, culminating in cardiac arrest, is not infrequent in clinical cases under chloroform narcosis.

The pathology of shock, which has been a subject for much controversy in recent years, seems now a more or less settled question. Exhaustion of adrenal function, as shown by Elliott, seems to be sufficient to account for the low arterial and venous tensions, and the consequent chain of shock—phenomena dependent upon defective blood supply.

The clinical indications of circulatory failure due to shock are increasing pallor, defective lung ventilation, diminution of the tension and volume with an increased pulse rate—the rate being an approximate guide to the severity of the state of shock, excepting in some instances of extreme age, in which the rate does not appreciably alter.

Some of the more important pathological states and various accidental circumstances that must be considered are: drowning by fluids filling the bronchi from below, or entering by way of the larynx from above; laryngeal obstruction by blood, vomit or foreign bodies; spasm or edema of the glottis; Ludwig's angina; retro-pharyngeal abscess; goitre; cerebral tumor; excessive hemorrhage; status lymphaticus; septic and fatty degenerations of the myocardium; valvular lesions and inadequately compensated hearts.

TREATMENT OF SYNCOPE.

Every effort in the treatment of syncope should be directed to restarting the heart. The physio-

logical indications are: (1) raising the venous blood pressure in the right heart cavities and in the large veins adjacent; (2) artificial respiration. The physiological rise in venous blood pressure appears to exert a stimulus on the restoration of the sino-auricular rhythm. As this rise in pressure is impaired in the syncope of excessive intoxication from anesthetic agents, it must be supplemented by rotating the patient into the head-down position, and artificial respiration; the former aided by the gravitation effect, and the latter by aspirating the splanchnic veins. The good head of venous pressure, moreover, furnishes adequate blood volume for filling the arterial system when the heart is restarted. The artificial respiration furthermore aids in restarting the heart and by the alternate compression and decompression of the pulmonary alveoli, the respiratory nervous mechanism is reflexly stimulated.

Rhythmic compression of the heart through the diaphragm, although entailing the opening of the abdomen in some cases, should always be tried if the previously mentioned measures fail. Experimentally, I have invariably succeeded in restarting the heart in this way; but have always failed in cases of myocardial paralysis from excessive intoxication as well as in cases in which the myocardium was pathologically impaired.

Hypodermic and inhalation resuscitative measures are ineffectual when there is no circulation.

TREATMENT OF EXCESSIVE INTOXICATION.

If the circulation and respiration still continue, simple withdrawal of the anesthetic agent is sufficient; or if the former continues, but the latter has ceased, artificial respiration must be resorted to. If the heart has ceased, no resuscitative measure will restart it. Experimentally, I have rapidly lowered the tension of the anesthetic agent in the myocardium, and restored the heart's action, by perfusion of isotonic salt solution through the coronary arteries, but this technic has no clinical value, on account of the pulmonary edema which ensues, and the difficulty of the surgical operation entailed. Rotation into the head-down position, artificial respiration, and rhythmic compression of the heart through the diaphragm are useless, but they should be tried in all cases, since there is a probability that syncope has completed the heart block, and in the presence of some excitability in the myocardium, resuscitation may be accomplished. Medicinal remedies are equally ineffectual since the circulation has ceased.

Prevention of syncope or of excessive intoxication is best attained by the pre-anesthetic injection of morphin and atropin and by the use of ether,

ether-oxygen, or nitrous oxid-oxygen, instead of chloroform, for anesthesia.

TREATMENT OF SHOCK.

The indications are: (1) To raise the blood pressure in the cavities of the right side of the heart and in the great veins adjacent, by inverting the body, head downwards, and by artificial respiration; (2) by restoring the body heat. Should the face color be good, inversion alone, without artificial respiration, will often suffice. In the presence of defective lung ventilation, warm oxygen inhalation usually proves helpful.

Saline infusion is not indicated, except in collapse from loss of blood. A plethoric rise of arterial blood pressure, induced by transfusion, is rapidly lost on account of the transudation of the fluid into the surrounding tissues. Ergot and pituitrin are useful in mild degrees of shock only. Adrenalin raises both the arterial and venous blood pressures, but its effect is transient, unless delivered in the vein continuously in a concentration of 1 in 500,000. In its use the pulse must serve as an indication to prevent cardiac inhibition or ventricular fibrillation. The flow of the solution should be almost stopped when the pulse falls to 60 per minute.

Operative shock is best combatted by using morphin and ether for general anesthesia. Their superior obtundent attributes induce more effective depression in the reflex arcs. Also dread of the operative procedure may be almost entirely obviated by proper preliminary morphinization. Spinal anesthesia may be employed for the same purpose in selected cases. Neither clinically nor experimentally have I found the obtundent efficiency of nitrous oxid so great as that of ether.

TREATMENT OF ACCIDENTAL AND PATHOLOGICAL CONDITIONS.

In cases of threatened drowning by flooding of the bronchi, the patient should be promptly inverted head downwards and artificial respiration started immediately. If this proves ineffective the bronchi should be aspirated through the opened trachea or larynx, and perfusion of oxygen used. Where the blood enters from below as in the rupture of a hydatid cyst, the sound side should be promptly turned uppermost, and blood clots, vomited masses, and foreign bodies hooked out of the larynx with the finger or a small sponge on a holder. Inducing an artificial cough by the sudden bimanual compression of the chest will often clear the larynx. When these measures fail, prompt laryngotomy is necessary. This also applies to edema of the glottis and other causes of prolonged laryngeal closure by

spasm. A preliminary injection of atropin and light ether narcosis tends to obviate respiratory failure in cases of cerebral compression with a slow pulse rate.

Goitre cases are best operated upon under light ether narcosis preceded by an injection of morphin and atropin.

Cases with edema of the glottis, or retro-pharyngeal abscess, Ludwig's angina, or status lymphaticus are too hazardous risks for general anesthesia and should invariably be operated upon under local analgesia. Cases of collapse from hemorrhage should be operated in the head-down position and continuous infusion of adrenalin-saline solution used as previously explained, under control of the pulse rate. The feeble, aged, the septic and the markedly anemic cases with myocardial weakness, all cases with imperfectly compensated and degenerated myocardium are best anesthetized by ether with the addition of oxygen, and unless contraindicated by the condition of the kidneys or of the respiration, morphin and atropin or scopolamin should be injected beforehand. Also, all operative procedures on these hazardous risks should be rapidly completed and the body warmth well maintained.

Morphin in rare instances markedly raises the threshold of the central nervous mechanism of respiration to carbon dioxid, the rhythm falling to even five or six per minute. Unless anoxemia results, it is unnecessary to use oxygen. Administration of carbon dioxid restores the normal rate. The dose of morphin should never exceed $1\frac{1}{6}$ grain.

Operations upon the thorax are preferably performed under Meltzer's intratracheal insufflation method of anesthesia. Ether pneumonia being almost entirely due to inspiration of buccal flora in the copiously secreted saliva and mucus. The preliminary use of morphin and atropin obviates the abnormal salivary and bronchial secretions, and thereby practically prevents post-anesthetic ether pneumonia.

Providing that the morphin is given before the onset of imperiling acidosis, its employment is a prophylactic measure against the baneful effects of general anesthetic agents upon diabetics.

245 LATROBE STREET.

THE AMERICAN ASSOCIATION OF ANESTHETISTS WILL HOLD ITS THIRD ANNUAL MEETING DURING THE PANAMA-PACIFIC EXPOSITION, AT SAN FRANCISCO, JUNE 19, 1915.

LOCAL ANESTHESIA IN MAJOR SURGERY
WITH ILLUSTRATIVE CASES.

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well Infirmary,

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In over 700 anesthetic fatalities between 1910-1913, collected from the English press by Flemming, and recently reported to the Anesthetic Section of the Royal Society, some 223 deaths occurred before the operative procedure was begun. It is a notorious fact that statistics with reference to anesthetic fatalities are incomplete, so that Flemming cannot be accused of exaggeration. The actual death-rate under general anesthesia far exceeds the recorded rate as estimated from newspaper reports and the verdicts of coroners' juries.

The immediate effects of chloroform and ether in precipitating acidosis, or producing paralytic ileus, complicates the post-operative course and retards or prevents the patient's expected recovery. The remote effect of ether on the kidney is to cause anuria, nephritis or acetonuria, while chloroform with its delayed toxemia produces fatty degeneration and necrosis of the hepatic cells. Both of these anesthetic agents may also be directly responsible for destructive changes in the cells of the central nervous system.

Nitrous oxid-oxygen is at present the nearest approach to a harmless method of general anesthesia. It has its disadvantages, however, such as the difficulty of administration, the necessity for an expert anesthetist; the expense involved; its failure to ensure the necessary relaxation for certain operative procedures; its dangers in the extremes of life; its comparative inefficiency in the presence of drug-habitation, alcoholism or individual idiosyncrasy. Its usefulness as an adjunct to local analgesia, as the perfecting detail of Crile's anoci-association cannot be questioned, and in this combination technic it becomes available for practically any operation of general surgery, and is safer than and equally as satisfactory as ether or chloroform narcosis.

Oil ether colonic anesthesia (Gwathmey), while possessing certain advantages in special operative procedures and systemic conditions, has shown a questionable mortality in the cases in which it has been employed, so far; and considerably more data must become available before the technic can be unreservedly indorsed. In its peculiar field it has many indications for use.

Spinal anesthesia is beset with technical difficul-

ties and harmful consequences, that place a narrow limitation on its utility.

While local anesthesia alone or in combination with nitrous-oxid-oxygen is now available for all operations of general surgery, the occasional necessity for using large quantities of the local analgesic agents prohibits the employment of cocaine on account of its toxicity. Alypin and novocain are less poisonous, but are still sufficiently so to involve considerable danger when excessive amounts are demanded by the exigencies of the operative procedure.

Bimuriate of quinin and urea is a non-toxic drug, efficient in harmless dilutions, effective in its obtunding qualities, easy of administration, and free from inconvenient complications on the tissues infiltrated. There is but one demonstrated danger in its use—*concentrated solutions*. A strength above one per cent., in some instances, will produce necrosis of the infiltrated tissues with consequent gangrene or sloughing. Concentrated solutions producing this complication are unnecessary, since a dilution of one-fourth of one per cent. is sufficient for obtunding the tissues; and solutions of this minimal strength do not produce exudation of fibrin in sufficient amount to retard healing or interfere with the subsequent vitality of the injected tissues.

The use of quinin as a local anesthetic was first reported in 1896, by Griswold of Fredonia, N. Y., before the Chautauqua Medical Society. Dr. Henry Thibault of Scotts, Ark., in 1907, demonstrated the efficiency of quinin-urea hydrochloride, hypodermically, as a local analgesic in one per cent. solution; and topically for mucous membranes in from ten to twenty per cent. solutions. Three years later, Hertzler, Brewster and Rogers of Kansas City reported their scientific researches regarding and clinical results with quinin-urea hydrochloride as a local analgesic.

Hertzler and Crile, are particularly responsible for the present wide-spread use of this analgesic agent in general surgery, and while Crile is very enthusiastic about the perfection of his anoci-association methods, Hertzler is inclined to be more circumspect in his claims. My personal experience with this analgesic agent has been so favorable as to warrant a general outline of the technic of its use and the report of some interesting illustrative cases.

The preliminary preparation of the patient is the same as that employed for routine operations under general anesthesia. One hour before the operation the patient is given $\frac{1}{4}$ grain morphin and 1/150 grain atropin, hypodermatically. The position on

the operating table is made as comfortable and free from strain as possible. The patient's confidence is gained and diverting conversation indulged in during the preliminary preparation, and throughout the operative procedure, when the surgical exigencies of the case permit. The operative field is painted with 5 per cent. iodine in alcohol, and infiltration of the tissues, for a distance of several inches around the line of incision, begun.

In patients of nervous or hypersensitive temperaments, the first puncture is made endermically with a one per cent. novocain or cocain solution, using not to exceed fifteen to thirty minims. Through this blanched and obtunded skin area, a needle of a 20 c.c. syringe is passed into the subcutaneous areolar tissue, and the area surrounding the site of incision infiltrated. Manual pressure over this infiltrated area not only diffuses the analgesic agent, but hastens the obtunding effect and renders it more complete. The proposed line of incision through the skin is now blanched with the novocain or cocain solution, as was done for the initial puncture. This gives the quinin-urea hydrochloride solution time to block the nerves supply of that area surrounding the incision, which would ordinarily remain sensitive to touch and traction.

The skin is now rapidly incised down to the aponeurosis of the muscle, which is in turn infiltrated. Meanwhile any bleeding points that present are ligated, thereby insuring an interval for the aponeurotic infiltration to desensitize the parts. The aponeurosis of the muscle is incised, and the peritoneum exposed. The perietal peritoneum must be thoroughly infiltrated for an area of several inches surrounding the proposed incision. Unless this step in the technic is carefully carried out, the relaxation desirable for intra-abdominal manipulations will not be secured.

Once the peritoneal cavity has been invaded extreme gentleness in the handling of the visceral anatomy must be observed. The viscera may be pushed aside or walled off in the usual manner, except that no traction must be made on the mesentery, since such traction immediately produces shock and elicits considerable pain. If the necessity for traction arises, the mesentery must be infiltrated. In operations on the uterine adnexa, the broad ligaments should be similarly infiltrated; likewise the neck of the gall-bladder and the meso-appendix, in gall-bladder and appendix operations, respectively.

All nerves exposed during the operative procedure should be blocked either by peri- or endoneural injection. It is important to preserve the

integrity of all neural structures, especially in operations for hernia, under local analgesia, as such a precaution seems to play an important part in preventing recurrences or postoperative hernias. In amputations of the extremities, the larger nerves should be exposed and endoneurally injected several inches above the operative field. Care and attention to minor details in nerve blocking, will go far in the effectual prevention of shock. Extreme degrees of shock may be precipitated under local analgesia by failure to completely and thoroughly obtund all the tissues and neural structures in the operative field, or by making undue traction on ligaments and pedicles. Extreme gentleness must be observed in all surgical manipulations. The nerves accompanying the larger arteries should be infiltrated, and should never be included in the hemostatic ligature, as this fault in technic may give rise to severe postoperative pain.

The following operative cases have been selected from the clinics of the Vaughan Memorial Hospital and Burwell Infirmary, to illustrate the wide range of local anesthesia in major surgery, and to demonstrate the accomplishment of such surgery under very adverse circumstances. The majority of these cases presented contra-indications to the use of ether or chloroform, and the consequent use of local anesthesia, in several instances at least, prevented, in my opinion, a fatal outcome.

ILLUSTRATIVE CASES.

CASE 1. Mr. H. M., age 55, operated on Feb. 12, 1912. Extreme emaciation. Food retention. Vomiting. Past history peptic ulcer. Diagnosis, pyloric obstruction. A median four-inch incision between the umbilicus and ensiform cartilage. Gall bladder, bile duct and the head of the pancreas palpated. Pylorus brought into the wound, found cicatricial stenosis, no evidence of carcinoma. Finney's pyloro-plasty done. Operative time, one hour. Patient had absolutely no pain, carried on a lively conversation with Dr. Chisolm, who had his usual place at the anesthetist's end of the table. Post-operative course smooth and uninterrupted, primary healing throughout. The patient left the hospital on the fourteenth day. His present condition two years after is good.

CASE 2. Maggie P. operated on May 13th, 1913. Colored, age 36. Brought to the hospital in a wagon. Fecal vomiting. Extreme distention of the abdomen. Pulse 120, temperature 97. Skin cold and clammy. Eyes sunken, expression anxious. No movement of the bowels in three days. Diagnosis of intestinal obstruction. Given a hypodermic of morphin and atropin. Prepared for the abdominal section under local anesthesia. Five-inch incision, made from the level of the umbilicus to near the symphysis pubis. On opening the abdominal cavity a large distended coil of ileum presented. This was drained by a rubber tube introduced into the lumen and invaginated into its walls. Emptying the gas and fecal matter permitted a search for the site of obstruction. Two constricting bands were found, one four inches and the other six inches from the ileocecal junction. One of these bands had almost severed the gut. The intervening two inches was so devitalized that resection was done. The patient complained of no pain during the entire operation, and at the end expressed a feeling of great relief from the agony she had been suffering for several days before she was admitted to the hospital. The drainage tube in the gut

was brought out at the lower end of the incision, and the wound closed. A quart of 4 per cent. soda solution was introduced into the gut through this tube and the patient returned to bed in good condition. The tube was removed from the bowel on the sixth day and on the twenty-second day she was dismissed from the hospital, cured; her wound healed.

CASE 3. F. W., Colored, age 50, operated on May 1, 1913. Seen first at 9 P. M., seventy hours after the beginning of strangulated hernia. This man had fecal vomiting, persistent hiccough, enormously distended, pulse 130, temperature 101. Skin cold and clammy. He was immediately removed to the hospital and the inguinal canal and sac were opened, and ten inches of necrotic gut were resected, end to end anastomosis. An enterostomy was done 2½ inches above the anastomosis, and a number sixteen catheter introduced into the gut, and passed through the anastomatic line and invaginated, and the end brought out of the abdomen through a stab wound. A modified Bassini operation done for the radical cure of hernia. The abdomen was closed and the tube allowed to drain off. Then two quarts of sodium bicarbonate solution was introduced slowly through the tube and allowed to drain immediately. Every two hours thereafter a pint of 10 per cent. glucose and 2 per cent. solution of soda was introduced through this tube. The tube clamped for one hour, and allowed to drain off for another hour. The stomach was washed out immediately and every four hours thereafter until the end of the next day. The glucose and soda solution was introduced by the Murphy drip per rectum for three days, after which he was able to retain nourishment, and his convalescence was uninterrupted. He is at present at work, and his hernia is completely cured.

CASE 4. Mrs. C. operated on Aug. 22, 1913; age 50, multipara, widow. Gall stones and empyema of the gall bladder. This patient had been treated for organic heart disease, and her attacks of colic had been mistaken for angina pectoris for two years. From prolonged starvation she was in such a reduced and weakened condition that a general anesthetic was contra-indicated. Under quinin-urea anesthesia an incision was made over the distended gall bladder, the same exposed, the intestine packed off, the gall bladder aspirated, removing 8 ounces of pus. The opening was enlarged and 38 medium sized stones removed. The gall bladder was drained, the wound closed up around the drainage tube. Her recovery was uninterrupted and she has gained 50 pounds since her operation. During the operation she engaged in conversation with the assistant and the nurses, and complained of no pain during the entire time.

CASE 5. Mr. D., age 78, operated on Sept. 9, 1913. Right inguinal hernia, enormous serotal sac extending to near the knee. The entire operative area was blocked off with quinin-urea solution and radical cure of his hernia done. The appendix was in the hernial sac; there were dense adhesions between the omentum and the sac wall. These were separated without pain, the omentum ligated and returned to the abdomen with the intestines sac dissected out and ligated. The operation was completed without pain or incident, the patient was allowed to be up in a rolling chair the day following the operation, and was kept up every day until he was discharged completely cured of his hernia eighteen days subsequently.

CASE 6. Dr. T., age 80, operated on Sept. 7, 1913. Came for the relief of persistent suprapubic urinary fistula following prostatectomy two years before. The irritation of the skin was extreme, and extended from the upper abdomen to below the knee. He had passed no urine through his urethra since the operation for the removal of his prostate. Examination showed a tortuous urinary fistula extending down posteriorly to and below the pubic bone. Sounds introduced into the urethra met an obstruction in the membranous portion of the urethra, the one and one-fourth inches of the prostatic urethra being entirely obliterated. Under local anesthesia a perineal urethrotomy was then done, and an effort was made to enter the bladder by the use of bifurcums and sound through this blind proximal and the prostatic urethra. As this could not be accomplished, a suprapubic cystotomy was done, dissecting out the old fistulous tract to near its exit from the bladder

down and just above the original urethral opening. The bladder was opened near the reflection of the peritoneum and an examining finger introduced finding complete obliteration of the vesico-urethral orifice. The fistulous opening could be palpated about one inch above the point where the urethral opening should have been. A straight sound was passed into the blind end of the membranous urethra from the perineal opening and forced through the old prostatic scar into the bladder. The opening was dilated and a catheter introduced for perineal drainage with the expectation that a new urethra would form. The opening in the fundus of the bladder was closed around a large drainage tube. The subsequent treatment of the patient was the same as that employed in the usual prostatic cases. Except for the eczema which was present when he came and which existed for months from a long continued soiling by the urine, this old man's convalescence was uneventful. He is voiding his urine naturally, and the perineal and suprapubic openings, and the fistulous tract have closed. I wish to say that the original prostatectomy was not done by me, and this deplorable condition resulted from either faulty technic or some avoidable incident or accident subsequent to the original operation. His gratitude can well be imagined, as he is changed from a walking urinal to a gentleman of normal habits and actions.

CASE 7. D., colored, age 86, operated on March 3, 1914. Thrown from a buggy and fractured the femur at the junction of the middle with the upper third. Sent to the hospital and a Hodgen's splint used. Gangrene in the foot developed. Under local anesthesia after blocking the sciatic and anterior crural nerves, amputation was satisfactorily done to the point where the fractured bones overlapped each other. In spite of infiltration around the periosteum, there was considerable shock when the lower fragment was dislodged. This old man developed anuria, and died from uremic coma four days after. This case demonstrates the fact that shock can arise even with local anesthesia, and that death can follow operations when done under local anesthesia.

CONCLUSIONS.

1. The number of fatalities occurring with melancholy regularity from the anesthetic alone should attract the serious attention of all surgeons.

2. Local anesthesia should be employed in all cases adapted to its use and where general anesthesia is contra-indicated.

3. The combination of local anesthesia with general anesthesia to shorten the time of inhalation narcosis and to block the nerves, thus lessening shock and permitting the employment of nitrous oxid gas, should be more generally adopted in the performance of major operations. Sloan's admonition that, "nitrous oxid gas is the safest known anesthetic in the hands of the expert and the least safe in the hands of the inexperienced," should be remembered.

4. Extreme gentleness and careful respect for the tissues in the course of the operation, and painstaking technic are essential.

5. The instruments must be well chosen. The needle for the syringe, and the knives and the scissors used in dissection must be of keen edge. Pulling on structures must be avoided, and tearing or blunt dissection find no place in the surgical technic under local anesthesia.

6. The patient must have faith in the operator, who in turn must have confidence in himself.

7. It must be borne in mind that no anesthetic is fool proof or free from danger, and that only by the minutest attention to details of the technic and with extreme patience in its execution can performance of major surgery under local anesthesia be accomplished.

SELMA, ALABAMA.

THE INTERSTATE ASSOCIATION OF ANESTHETISTS WILL HOLD ITS ORGANIZATION MEETING AT CINCINNATI, OHIO, MAY 4-5, 1915. AN ELABORATE PROGRAM WILL ALSO BE PRESENTED.

KIDNEY FUNCTION AND ANESTHESIA.

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In order to understand clearly the changes in urinary output which follow anesthesia it is necessary to detail first some of the factors that help to maintain a normal secretion.

Modern writers like Hans Meyer and Gottlieb¹ hold that we are still far distant from a complete understanding of the mechanism of urinary secretion on purely physico-chemical grounds. While strictly speaking this is no doubt true, it is questionable whether there is anything gained by slipping back into the older teachings of the Heidenhain School and saying that a kidney secretes because it is able to. Certain it is that the last decade has helped to a better formulation of the physico-chemical conditions which are the *sine qua non* for secretion, and equally certain is it that the gains thus made may be used to advantage clinically.

Martin H. Fischer² has given us on a colloid-chemical basis a clear and logical explanation, supported by uncontroverted experimental facts, of the mechanism by which the body holds under varying conditions not only a normal amount of water but also such abnormally large quantities as are characteristic of edema.

He holds that the water in the body is not free, but is held as hydration water in combination with the protein colloids; and that the body cannot take up any more water or give off any except as the state of these colloids is first changed. Water does not become available for urinary secretion, therefore, except as it is first brought to the kidneys in a free state.³ The blood and tissues hold under normal circumstances what we call a constant amount of water. Water taken into the body in excess of the amount necessary for this saturation remains free in the blood and is excreted in some form, as from the skin, the lungs, the bowel, or as urine. The amount of water held by the blood and tissues is determined by the state of their colloids, which in turn is dependent upon the amount and kind of acid, alkali or salts contained in them. Thus, if their acid content is raised, more water is held by the tissues, in other words, an edema follows. When more water is thus held, less free water remains over to be available for secretion.

While an edema may affect any organ, it is a more serious state in some than in others. An edema of the brain is more serious than one of the skin, for example. Especially may an edema be serious in its effects if the involved organ is hampered in its swell-

ing. Such hampering makes things worse, for the swelling organ then tends to shut off its own blood supply. This is true, for example, of the kidney, which being surrounded by a firm capsule, can only swell to a limited degree before it begins to shut off its blood supply. With the lack of oxygen thus produced, a diminished kidney function (as betrayed by a diminished urinary secretion) becomes progressively worse and may go on to complete suppression, *anuria*.

We are indebted to Hans Meyer and E. Overton for explaining why narcotics, such as the anesthetics, while capable of affecting all living cells, produce their greatest effects in the higher animals upon the central nervous system. Because of their greater solubility in the fats and fatlike bodies—the *lipoids*—they accumulate in greater concentration and more quickly in the central nervous system and the adipose tissues than elsewhere in the body.

The best explanation of *why* they act anesthesiologically is given by Verworn. This author has shown that anesthetics enter into loose physico-chemical combination with the lipoids, wherefore these lose their normal relation to the other cell constituents. As a result, the entire chemistry of the cell is inhibited. Among the results of this inhibition is a lessened absorption or utilization of oxygen. But whenever the oxygen supply to any cell or organ is thus cut down an abnormal increase of its acid content results. But such, in its turn, by increasing the capacity of the involved tissues for water is followed by edema. It is this edema which makes the anesthetized subject after the anesthesia feel *dry* and call for water. The very fact that the patient is thirsty and that his tissues are therefore not saturated with water means, of course that there can be no free water in the body. This fact is betrayed through the kidneys, which show it by a diminished urinary secretion.

The chemical effect of the anesthetic upon the chemistry of the whole body evidences itself in certain qualitative and quantitative changes. There is, for example, an increased hydrogen ion and titration acidity observable on examining the urine and a diminished chlorid output. At the same time the presence of incompletely oxidized bodies, as acetone and diacetic acid and betaoxybutyric acid, may be found. If the resultant acid intoxication is severe, albumin and casts appear in the urine and an increased ammonia elimination may be observed. The presence of albumin and casts means that the acid intoxication has gone so far in the kidney that parts of it have gone into solution. The presence of acetone and diacetic acid means that carbohydrate

and fat metabolism has been so upset that they are not completely oxidized, as normally, into carbon dioxide and water. The retention of chlorids by the tissues goes hand in hand with increased acidity and is due to this acidity. An increase in the acid content of a tissue not only leads to a retention of water—*edema*—but to a retention of certain salts at the same time.

These considerations show that *urinary secretion is possible only when free water circulating in the blood is brought to the kidney, and that an anesthetic produces the effects it does because it leads to a lack of oxygen in the tissues of the body. This raises their acid content, and makes them absorb more water from the blood, which in its turn diminishes in that proportion the amount available for secretion.* The kidney secretion diminishes not because of a specific poisonous effect of the anesthetic upon the kidney alone, but because of this effect upon all the tissues and organs of the body.

During the latter part of 1913, assisted by Grace McKenna, I examined 400 post-operative urines at the St. Francis Hospital in San Francisco. I found 94.2 per cent. of the cases to show a marked increase in the hydrogen ion acidity. Forty-nine per cent. showed acetone or acetone and diacetic acid. Twenty-six per cent. showed albumin and casts. Whenever these findings were noted there was also found a low chlorid-output. In the great majority of cases only a trace was excreted. The surgical series embraced about everything for which operations are made. The average time per operation was 55 minutes; the average amount of ether given, 120 c.c. The post-operative symptoms of nausea, vomiting, headache, and gas pains paralleled completely in their intensity the intensity of the changes noted in the urine.

This very evident parallelism between degree of acid intoxication and certain post-operative findings which have been and still are regarded as largely unavoidable and necessary consequences of operative interference suggested the probability that much could be done to make these patients not only better surgical risks, but also to make their post-operative history freer from complications than is now the case, if only some well recognized physiological facts were utilized in surgical practice. This has been found to be possible to a remarkable extent, not only in my own cases, but in those of some of my colleagues. We have made it a rule, where emergency did not interfere, to discover in all cases before operation how heavily *acidosed* our patients are, and then not to operate until through proper feeding and by the administration of alkalis such acidosis has been overcome.

In this connection it should be clearly borne in mind that much clinical misinformation exists in clinical and surgical circles to-day as to the question of when a patient is really *acidosed*. This word should be used as synonymous with *acid intoxication*. An acid intoxication is revealed by a persistently high hydrogen ion acidity,⁴ or titration acidity of the urine,⁵ by a high ammonia coefficient,⁶ by a low carbon dioxide concentration in the blood or expired air, and by the inability to hold the breath as long as normally.⁷ Ordinarily it is said that the appearance of acetone, diacetic acid, and betaoxybutyric acid is evidence of an *acidosis*. This is not the case. It is *qualitative* evidence of a disturbed body chemistry from which an acid intoxication may result, but obviously, an organism may be poisoned to death with even the *normal* acids formed in body metabolism, while, on the other hand, even a great production of *abnormal* acids may leave the body uninjured, if only enough alkali is constantly available to neutralize the acids as formed.

These facts have been utilized as guides to a more scientific pre-operative preparation of the surgical patient and his subsequent post-operative care. Most pre-operative preparation used to be, and in some places still is, of a type to guarantee from the outset a maximum of discomfort and even danger to the patient. Routine examination of the patients to be operated on, even when not suffering from infections or intoxications likely to be complicated by nephritis, show that in the days before their operations they are usually pushed into a state in which post-operative complications are very likely to appear. Commonly the urine shows a high hydrogen ion concentration. Such patients make poor surgical risks, and should be given the advantage of preliminary treatment. The mental anxiety so common in surgical cases expresses itself physiologically by increased muscular tone, and this declares itself in the high acid findings in the urine. How much the intelligent reassurance of the surgeon must mean to such patients is obvious.

Patients are also too commonly ordered upon a *light* diet. In this way the acid products of a starvation diet are added to those already present from other sources. Unless there are specific reasons against it, a surgical patient should be fed to within six hours of his operation, and since carbohydrate starvation is the commonest and earliest form, special attention should be paid to getting an easily assimilable sugar-starch ration into him.

I usually order the protein intake cut down somewhat, and put in its stead more carbohydrates. The use of mushes, oatmeal cooked for three hours and served with plenty of sugar, malted milk, or any of

the prepared foods that contain maltose and dextrose in an easily assimilable form does very well.

In addition, the patient should be given *water*, as urinary secretion is only possible by furnishing a sufficient quantity of free water. It must be remembered that large quantities of *pure* water alone tend to wash the salts out of the tissues. This may be met by combining with the water salts up to a *physiological* concentration, and alkalies. Natural or artificially prepared mineral waters are particularly easily borne by the patient and when these contain a maximum amount of calcium they are particularly satisfactory, for a lack of calcium seems to be responsible for many of the so-called *acidosis* effects. The amount given should be regulated by the urinary reaction. I see that my patients reach the operating table with their urine alkaline to litmus or rosolic acid, and passing at least 1,500 c.c. urine a day. If a water containing calcium is not readily available, I give calcium acetate in gram (15 grain) doses three or four times in the twenty-four hours in addition to whatever water I use.

The feeding of carbohydrate and the use of water, alkali, and salt should be started, if possible, at least two or three days before the anticipated operation either at home or in the hospital, and continued until the patient has a urine persistently neutral to litmus or rosolic acid. He should enter the operating room in this condition. A patient who goes to the operating table with a highly acid urine, or with a high ammonia coefficient, or with products showing a disturbance in his carbohydrate metabolism, *acetone* and *diacetic acid*, is a bad surgical risk.

I see that the bowels are moved just before the operation. I use instead of the ordinary enema one consisting of a quart or two of water containing one or two ounces of bicarbonate of soda. This the patient is allowed to reject in the ordinary way, but since all does not come out, a considerable dose of alkali is thus given the patient just before he is subjected to his increased surgical acidosis, the result of his anesthesia, his acid production from the pain of the operation, and his post-operative suffering.

Patients prepared as I have outlined recover rapidly from the effects of their anesthesia. They are without headache, *absence of brain edema*; they vomit little or none at all, *absence of edema of the medulla*; they urinate an hour or two after the operation, *absence of kidney edema* and *early presence of free water*; the urine is practically free from albumin and casts and excess of ammonia. Moreover, the traumatized tissues at the seat of the operation swell less and are less painful, due also to the decreased edema.

The choice of anesthetic should receive consideration. The toxic effects of an anesthetic, as far as the kidneys are concerned, deserve consideration from several standpoints. In the first place, no anesthetic, be this chloroform, ether, or nitrous oxid, can produce its desired effects without interfering with the oxidation chemistry of the body. In fact, anesthesia depends largely, if not entirely, upon such effect. We need not, however, add to this load by giving the patient too little oxygen. One of the superior merits of nitrous oxid anesthesia resides not so much in the anesthesia itself as in the fact that oxygen accompanies it. Nor may we say offhand that the bad effects of an anesthesia are simply a function of its length and the quality of anesthesia used. Alvin Powell found in a carefully studied series of operative cases that when but little anesthesia was used, and perfect muscular relaxation was not obtained, the patients showed more casts and albumin in the urine than when they were anesthetized longer and more deeply. On the other hand, very deep anesthesia was again followed by more albumin and casts. I have noted the same facts in experimental work on rabbits.

These findings are to be interpreted as follows: The bad effects avoided by use of but little anesthesia are more than counterbalanced by those incident to the great acid production consequent upon imperfect muscular relaxation. The imperfectly anesthetized subject responds with muscular contraction to the irritation due to surgical trauma. A medium degree of anesthesia increases the toxic effect of the anesthetic, but eliminates the acid factor due to muscular rigidity. In deep anesthesia a maximum of interference with normal oxidation chemistry is again assured by the anesthetic itself.

Similar conditions hold in determining the value of morphin, atropin, scopolamin, and similarly acting drugs administered before or after an operation. Their bad effects on the oxidation chemistry of the tissues may be offset by the assurance of better muscular relaxation, with the elimination of acid production from this source.

I always give scopolamin (gr. 1/200) and morphin (gr. 1/6) one hour before operation, as I find that less anesthetic is necessary under these conditions, and in a patient properly alkalinized with plenty of free water available for secretion there is no danger in this. By this means one obtains better muscular relaxation and hence less acid production which more than overbalances the bad effects of the narcotic alone.

The value of local anesthetic measures, in the use of novocain, quinin, and urea hydrochlorid, as in

nerve blocking and in tissue infiltrations, is similarly explained. Their use prevents pain impulses from reflexly expressing themselves in increased muscular tone. I infiltrate each layer with 0.25 per cent. novocain and block the area with 0.2 per cent. quinin and urea hydrochlorid.

By following such simple details the good surgical patient is not only kept so, but many a bad one bordering on an acid intoxication is not pushed over the line into a serious or perhaps fatal terminal state. Cheerful surroundings, confidence in surgeon and nurse, proper anesthesia, and the blocking of peripheral impulses keep the acid production in the body low, while carbohydrate feeding, alkali, salts, and water push the danger threshold further away. The latter elements protect the body against the effects of the operation—the intoxication of the anesthetic and the acid effects due to post-operative suffering.

Following operation, the patient is allowed an alkaline mineral water either plain or as a fruit-ade. Early administration of the juice or pulp of grapefruit and oranges with sugar works excellently. The fruit acids are oxidized to carbonates so that these foods represent a feeding of alkali. If there is no vomiting I start carbohydrate feeding by mouth within a few hours after the operation. Sweetened fruit juices, hot or cold malted milk, and candy I find excellent.

In cases of marked toxemia, especially in victims of a subacute or chronic infection, more sugar than can be given by mouth should be administered. In this type of case the rectal administration of 4.5 per cent. anhydrous dextrose by the drip method works very well.

Up to the present we have contented ourselves with dealing with the rôle of the acids in the production of edema in the different organs of the body. Recent experimental work by Martin H. Fischer and Anne Sykes⁹ shows that urea, pyridin, and some of the amins lead to marked hydration of proteins. This observation seems to be of fundamental importance in connection with the edemas associated with the infections, for many of the bacterial toxins are amin in character. The point of interest about the edemas produced by the amins is that they are different in type from those produced by acid, for while the latter are relievably by the use of bases and salts, those produced by urea and the amins are not thus influenced. On the other hand, the sugars, which influence acid edemas but little, dehydrate this second type of edema tremendously.

Martin H. Fischer and Anne Sykes⁹ have also

shown that the sugars dehydrate the body as they dehydrate simple proteins. The diuretic action of the sugars depends upon this fact and like the saline cathartics the sugars act as diuretics primarily, not because of a specific action upon the kidney, but because they dehydrate the tissues of the whole body. The degree of diuresis increases with every increase in the concentration of the sugar.

Especially in the toxemic cases have I found the sugars to produce excellent results. The dextrose not only acts as a food and thus furnishes the necessary carbohydrate so often lacking in the body, but it is a powerful dehydrator. In this second capacity it reduces the swelling of edematous organs, such as the kidney, brain, liver, and bowel, while secondarily it leads to a liberation of water, thus increasing the urinary output. Clinically, I have found the rectal or intravenous injection of sterile, hypertonic anhydrous dextrose solutions—up to 18 per cent.—to produce most spectacular results in anuria, ileus, coma, persistent vomiting, and glaucoma.

I hope that these few remarks may have helped to a better scientific understanding of why sugars, alkalies, and salts which in one way or another have been used empirically for generations in the care of the surgical patient, really accomplish their purpose.

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291 GERRY STREET.

Be progressive and attend either the American or Interstate Anesthetists' Meeting.

ORAL ANESTHESIA WITH SPECIAL REFERENCE TO SURGICAL OPERATIONS FOR CHRONIC ALVEOLAR ABSCESSSES.

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Local anesthesia has assumed an important rôle in minor as well as in major surgery, but in no special procedures has it so many advantages over general anesthesia as in oral surgery and operations on the teeth. Not only are the disadvantages of general anesthesia for intraoral operations many, but there are also unavoidable dangers associated with its administration.

DISADVANTAGES OF GENERAL ANESTHESIA FOR INTRA-ORAL OPERATIONS.

The administration of a general anesthetic for an operation in the mouth requires the co-operation of an expert anesthetist. The oral surgeon, as a rule, has a competent assistant or calls on an experienced anesthetist to take charge of this important phase of the procedure; while the dentist, in general practice, frequently uses his secretary or lady assistant for this purpose. Not having had any scientific training in the use of anesthetics, these latter are usually absolutely incompetent. Existing surgical standards are just as grossly violated by the man who has the idea that he can be anesthetist and operator at the same time. Intraoral operations performed under the unfavorable conditions brought about by general anesthesia require the greatest possible skill and the undivided attention of the operator. The responsibility of administering a general anesthetic should, therefore, be taken from the shoulders of the operator; nor should his entire concentration on the necessary surgical technic be distracted by efforts to run one of the more or less complicated machines used by modern anesthetists for the administration of general anesthesia by the nasal or oral methods.

The necessity for a skilled anesthetist is the least of the disadvantages of general anesthesia in safeguarding the patient. Nitrous oxid-oxygen and somniform, as administered by the incompetent, even in a careless manner, are comparatively safe in spite of the fact that many administrators possess little of the anatomical, physiological, and therapeutical knowledge or the technical skill to safely render a patient unconscious.

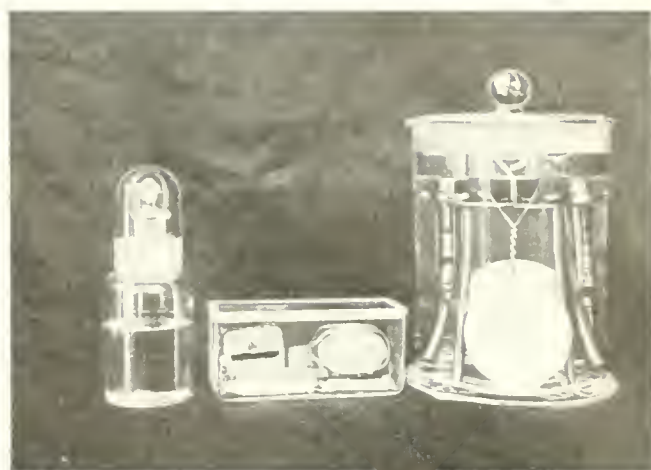
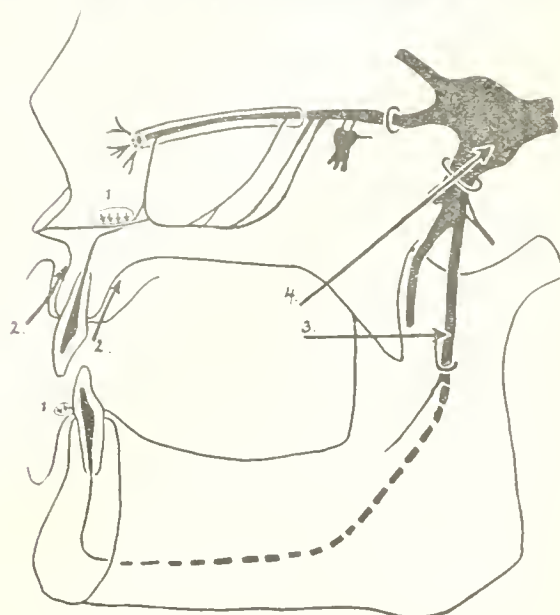


Fig. 1 Instruments used in connection with local anesthesia. Bottle for normal salt or Ringer solution. Tray for drugs and reserve needles. Jar filled with absolute alcohol, in which are kept two syringes and two dissolving cups. One syringe with 26 m.m. iridio-platinum needle for infiltration anesthesia, the other with a 42 m.m. iridio-platinum needle for conductive anesthesia. The dissolving cups are used to measure and hold the solution made by dissolving the tablets in the normal salt or Ringer solution. The syringe is filled direct from the cup.

The real disadvantages of general anesthesia for intraoral operations are the following: (1) The inability of the patient to co-operate with the oral surgeon, which counts for a great deal, especially when operating in the back of the mouth; (2) manipulation or instrumentation is rendered more difficult on account of the space occupied by mouth props or gags; (3) the operative field is continually obscured by saliva and blood—the venous bleeding being increased under some of the general anesthetics; while under local anesthesia the field may be rendered anemic to any desired degree. The coughing under

Fig. 2. This illustrates the different methods of local anesthesia in the oral cavity. (1) Surface Anesthesia; (2) Infiltration Anesthesia; (3) Conductive Anesthesia; and (4) Gargle Anesthesia.



general anesthesia requires sponging and this occupies an assistant almost continually, thereby prolonging the operation considerably. Although rigid asepsis in the mouth is usually considered unnecessary, I am of the opinion that the greatest possible efforts towards an aseptic result should be made. The blood mixed with the saliva, which rapidly overflows the mouth, presents the greatest danger for infection, as almost any bacteria can be found

pass into the trachea, the protective reflex action being inhibited by the narcosis. Likewise large amounts of blood may be swallowed, causing nausea and vomiting, and there is additional danger of lung infection from aspirated blood and saliva.

METHODS OF LOCAL ANESTHESIA FOR INTRAORAL OPERATIONS.

The use of local anesthesia for intraoral operations requires a thorough anatomical knowledge of

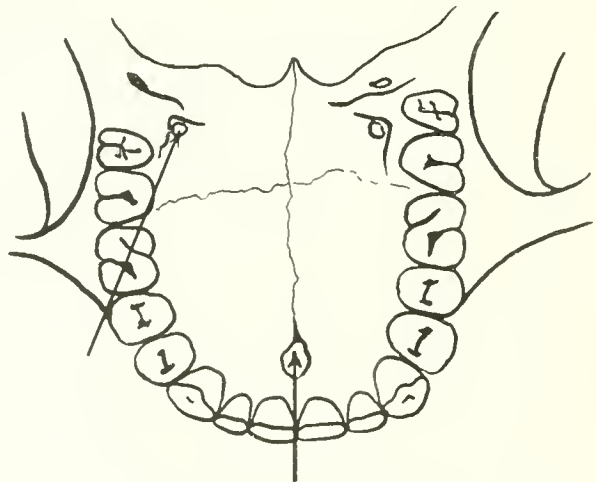
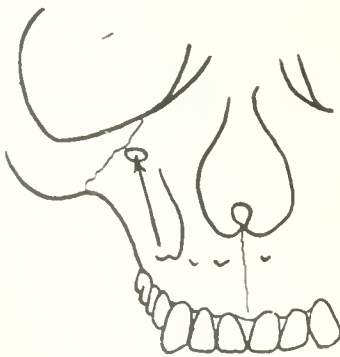
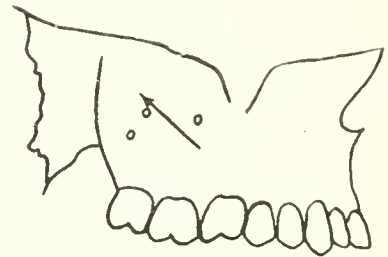
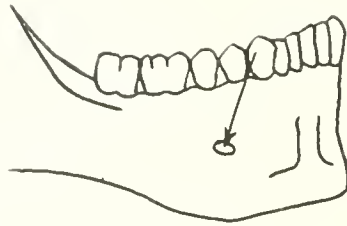
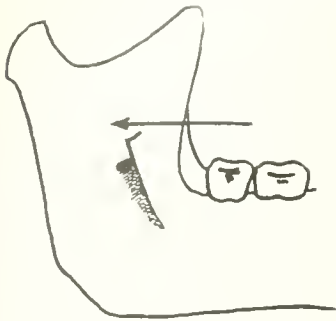


Fig. 3. Conductive Anesthesia: Pterygo-Mandibular Injection.

Fig. 4. Conductive Anesthesia: Mental Injection.

Fig. 6. Conductive Anesthesia: Infra-Orbital Injection.

Fig. 5. Conductive Anesthesia: Zygomatic Injection.

Fig. 7. Conductive Anesthesia: Incisive and Posterior-Palatine Injections.

in it; and if vomiting, due to the general anesthetic, occurs during the operation, the toilet of the operative area is so much the more difficult. While post-operative pain may be due to operative traumatism alone, it is also commonly caused by bacterial action on the nerves. Infection of the wound may occur during or after the operation. In very many cases complications can be eliminated by operating under local anesthesia, using the ordinary aseptic precautions, especially if sutures can be used to close the wound.

Other dangerous incidents are liable to occur under general anesthesia, especially if its administration is conducted by the operator. An extracted tooth or portion of it may slip from the forceps and

the operative area and its nerve supply, scrupulous asepsis, exact technic, and suitable instruments (Fig. 1). It is a principle in modern methods to separate the induction of local anesthesia from the operation proper, having an interval during which anesthesia deepens. There are four different methods of inducing local anesthesia in the oral cavity (Fig. 2):

1. Surface anesthesia.
2. Infiltration anesthesia.
3. Conductive anesthesia.
4. Ganglion anesthesia.

While all these methods are available, each has its limits and indications.

1. SURFACE ANESTHESIA.

This method is accomplished by the application of local analgesics and its efficiency depends on the absorbing quality of the mucous membrane. Its utility is very limited and it has generally no deep action.

2. INFILTRATION ANESTHESIA.

In this method the mucous membrane, skin, and deeper tissues are infiltrated with the anesthetic solution, and the dental nerves, before they enter the teeth, are anesthetized by the absorption of the analgesic agent through the pores of the alveolar process. The deeper action of this method is only practical for the maxillary teeth and the four mandibular incisors, because of differences in the osseous structure of the maxilla and mandible.

Generally speaking, with this method, the injection is made directly into the field of operation, thus anesthetizing the peripheral nerve endings. Anesthesia is complete in a very short time, usually in about five minutes, after which interval small surgical or such dental operations as extraction of the tooth and extirpation of the dental pulp may be painlessly performed. This method is contraindicated in septic conditions.

3. CONDUCTIVE ANESTHESIA.

Conductive anesthesia is the ideal method of producing anesthesia in the oral cavity. The injection is made at a point remote from the field of operation, and a comparatively large area can be successfully obtunded with one small injection. Here the conductivity of a whole nerve trunk can be intercepted at a convenient point, and a complete anesthesia of the peripheral area of its distribution secured.

For more extensive operations, especially if anemia of the operative field is desired, it is better to combine the infiltration with the conductive method.

There are six convenient places in the oral cavity where conductive anesthesia can be readily induced:

(a) *The Pterygo-Mandibular Injection.* The pterygo-mandibular space is the space between the internal surface of the ramus mandibularis and the pterygoid muscles and outlined by the sulcus mandibularis. In this space, which is filled with connective tissue, the inferior alveolar nerve enters the mandibular foramen (Fig. 3). If this nerve is injected at this point, we get anesthesia of half the lower jaw, including the teeth and lower lip. The lingual nerve may be included in this injection, resulting in anesthesia of the lingual gum and side of the tongue.

(b) *The Mental Injection.* The solution is in-

jected into the mental foramen to anesthetize the anterior portion of the inferior alveolar nerve (Fig. 4).

(c) *The Spheno-Maxillary Injection.* This injection is used to secure anesthesia for more extensive operations about the upper jaw. The solution is injected into the spheno-maxillary fossa, anesthetizing practically the whole second division of the trigeminal nerve. Ordinarily sufficient anesthesia may be obtained by anesthetizing the larger branches of the second division, supplying the parts upon which we are going to operate.

(d) *The Zygomatic Injection.* The three maxillary molars and soft tissues at the buccal side are supplied by the posterior superior alveolar branches, which can be reached and injected at the zygomatic surface of the maxilla (Fig. 5).

(e) *The Infra-Orbital Injection.* By forcing the solution through the infra-orbital foramen into the infra-orbital canal, anesthesia of the peripheral distribution of the infra-orbital nerve, which supplies the anterior teeth and labial gum, may be secured (Fig. 6).

(f) *The Incisive Injection.* The naso-palatine nerve can be blocked where it emerges through the incisive foramen, resulting in anesthesia of the anterior third of the palate (Fig. 7).

(g) *The Posterior Palatine Injection.* This injection can be used to anesthetize the lateral half of the posterior two-thirds of the palate, by blocking the anterior palatine nerve as it emerges through the larger palatine foramen.

4. GANGLION ANESTHESIA.

Injections can be made directly into the Gasserian Ganglion for some of the largest surgical operations of the face and mouth. The technic of this injection is difficult to acquire and it should be practiced on the cadaver on account of its value in the treatment of trigeminal neuralgias.

PREPARATION OF THE SOLUTION.

At the present time the best substitute for cocaine in local anesthesia is novocain. Suprarenin, a synthetic compound to replace adrenalin, is the safest admixture to secure anemia of the operative field. In this connection, while the use of novocain has eliminated much of the toxic element in local anesthesia due to the use of cocaine, nevertheless, as I have previously pointed out, standard percentage strengths of novocain should not be exceeded, and the admixture of suprarenin should be cautiously controlled. The toxic symptoms presenting under novocain anesthesia may, in the majority of instances, be traced to too high a percentage of supra-

renin, and in consequence in my routine work I have materially reduced its percentage as present in the novocain-suprarenin tablets offered by the trade. I accomplish this dilution by combining two standard formulas with varying quantities of normal salt or Ringer solution.

These standard formulas are as follows

Formula E.

Novocain	0.02	gram.
Suprarenin Synthetic	0.000,05	gram.

Formula F.

Novocain	0.05	gram.
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Ringer Solution Tablets.

Sodium Chloride	0.050	gram.
Calcium Chloride	0.004	gram.
Potassium Chloride	0.002	gram.

Sig. Dissolve ten tablets in 100 c.c of distilled water and sterilize.

For normal cases use 1 F and 1 E tablet dissolved in 3½ C.C. normal salt or Ringer solution. This gives a solution containing:

Novocain	2 per cent.
Suprarenin Syn.	0.000,015 gram. to 1 c.c.

For abnormal cases, cardiac disorders, arteriosclerosis, nephritis, hysteria, use 2 F tablets and 1 E tablet dissolved in 6 C.C. of normal salt or Ringer solution. This gives a solution containing:

Novocain	2 per cent.
Suprarenin Syn.	0.000,009 gram. to 1 c.c.

For deep anemia for local injections, to render the field of operation anemic, use 1 E tablet to each c.c. or normal salt or Ringer solution. This gives a solution containing:

Novocain	2 per cent.
Suprarenin Syn.	0.000,05 gram. to 1 c.c.

REQUIREMENTS OF SOLUTIONS PREPARED FROM
TABLETS.

1. The solution should be used immediately after it has been prepared.

2. The solution should not come in contact with anything except the porcelain cup in which it is sterilized and the syringe. It should not be left longer than absolutely necessary either in the dissolving cup or syringe, as the solution is very sensitive, being affected and chemically changed by air, heat, light, and especially by alkalis.

3. The tablets should not be touched by hands or instruments and the tube should be closed immediately after use with a rubber stopper. The tablets are readily changed by air, light, and especially by exposure to moisture.

4. The tablets should be white. If the uppermost tablets in the tube are discolored from chemical changes caused by improper handling of the tube,

they should be discarded, as their use involves danger.

5. The solution made from the tablets should be crystal clear. If it shows any light pink color it must be discarded.

6. The normal salt or Ringer solution should be freshly prepared from distilled and sterilized water.

SURGICAL TREATMENT OF ALVEOLAR ABSCESSSES.

Since physicians and dentists have been using the X-ray more freely as a means of diagnosing conditions of that portion of the tooth which is embedded in the alveolar process, they have become aware of the enormous number of alveolar abscesses that have heretofore gone undiagnosed. There are two types of alveolar abscesses divided according to the difference in their clinical aspects.

The first kind is connected with the oral cavity by a sinus, through which the purulent exudate escapes.

The second type is the so-called *blind abscess* and is located either at the end or side of the root, and as there is no outlet the exudate cannot flow into the mouth.

(a) *Alveolar Abscess with Sinus.* This first type is easily noticed; the patient is usually aware of the condition, although, generally, there is no physical suffering connected with it. The purulent matter which continually escapes into the mouth is swallowed, and Hunter, in view of his hospital investigations, gives the following possible results: (1) Local affections, stomatitis, periostitis, sinus infections, tonsillitis, and pharyngitis; (2) glandular affections, especially about the neck; (3) gastric and intestinal affections, such as septic gastritis, colitis, and appendicitis; (4) hematogenous infections causing pleurisy, empyema, or nephritis.

(b) *Blind Alveolar Abscess.* This second type, *blind alveolar abscesses*, are not easily diagnosed, and the patient is usually ignorant of their existence. They are readily seen in the radiograph and are of varying size and shape. The pathological examination shows a fibrous granulum, containing the exudates, which are of varying color, odor, and bacterial infection. The staphylococci, pyogenii, streptococci, the diplococcus rheumaticus are some of the more common bacteria present. From these foci toxins are absorbed under pressure and also the pathogenic bacteria escape from the granulum, reaching the systemic circulation through the surrounding lymph spaces or capillaries, and cause, as has been borne out by the recent careful investigations of the most reliable authorities, skin affections, septic endocarditis, arthritis, and nephritis. The etiology of these conditions makes a very interesting

study in itself, but, generally speaking, we can say that the majority of the cases result from infected root canals of the teeth, while a smaller number occur in association with pyorrhea alveolaris and other causes.

TREATMENT OF ALVEOLAR ABSCESSES.

Treatment with medicines. Antiseptics applied into the root canal of a tooth are not always sufficient to sterilize the peridental granulum.

dentistry, where every aching tooth fell a victim to the forceps, we have undoubtedly grown into the other extreme. Even the public has been educated to the fact that every devitalized tooth or root can and should be saved as long as there is no pain and discomfort, and as a result of this conservative dentistry we find to-day that about 25 per cent. of the population suffer from chronic alveolar abscesses.

It is my opinion, that all teeth with chronic

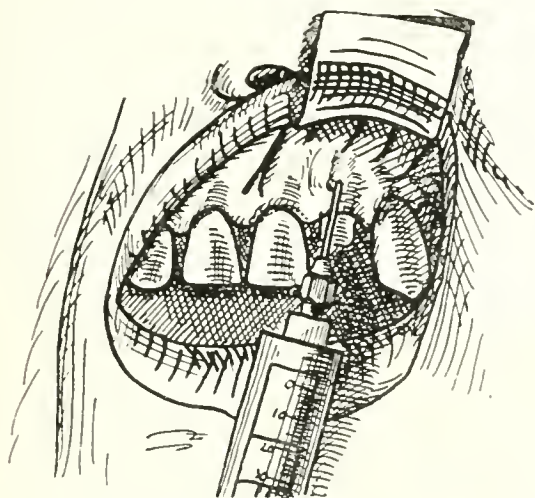


Fig. 8. Apex Amputation of Lateral Incisor, which later will receive a porcelain crown: Labial Injection.

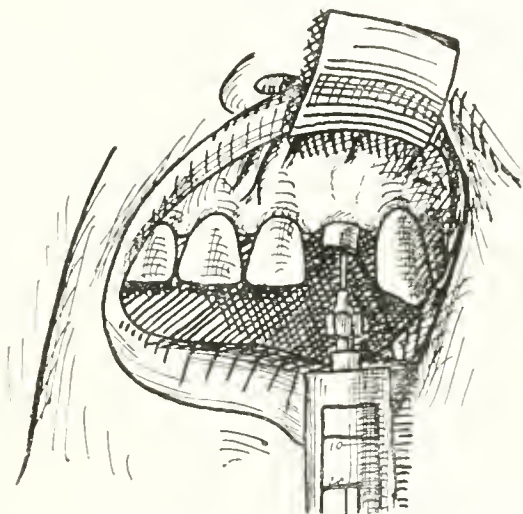


Fig. 9. Apex Amputation: Palatal Injection.

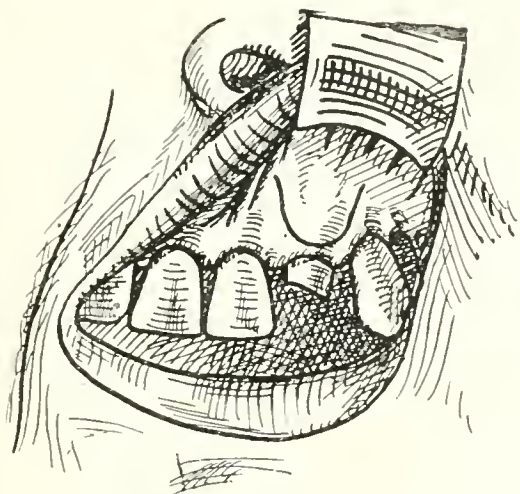


Fig. 10. Apex Amputation: Incisors.

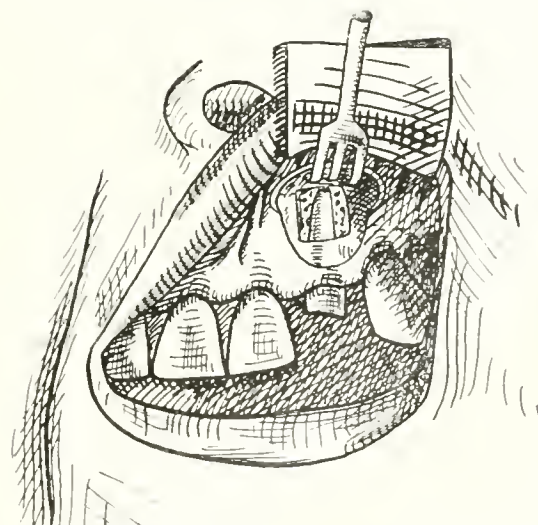


Fig. 11. Apex Amputation: After removal of the Alveolar Process over the distal root.

Ionic medication. Ionic medication is recommended, and is effective in cases where no absorption of the apex of the tooth has taken place, and where the anatomical structure of the root canal allows, after being thoroughly cleaned and enlarged, a perfect root canal filling. This should be inserted so that it hermetically seals the apical foramen of the tooth.

Surgical treatment. From the primitive days of

alveolar abscesses, whether so-called *blind* or *with sinus*, should be treated surgically, with the exception of cases of short duration, where these can be treated with ionic medication, if the radiograph shows clearly that no absorption of the root has taken place, and where the anatomical structure of the tooth makes an hermetic root canal filling possible, and where the treating and filling of the root canal has been successful.

Surgical treatment is either radical or conservative, and is indicated in all cases, where the abscess is a suspected or established focus of some other systemic or organic disorder. In these cases, it should be made common practice to take a culture, under the necessary precautions, from the apical part of the tooth, both for scientific study, as well as for vaccine treatment, should it be indicated. Extraction of the tooth and thorough curetting of the abscess cavity is indicated in all cases where the conservative surgical treatment is not practicable. The conservative surgical treatment consists in amputation of the diseased root-end, extirpating the granulum, and curetting of the alveolar process.

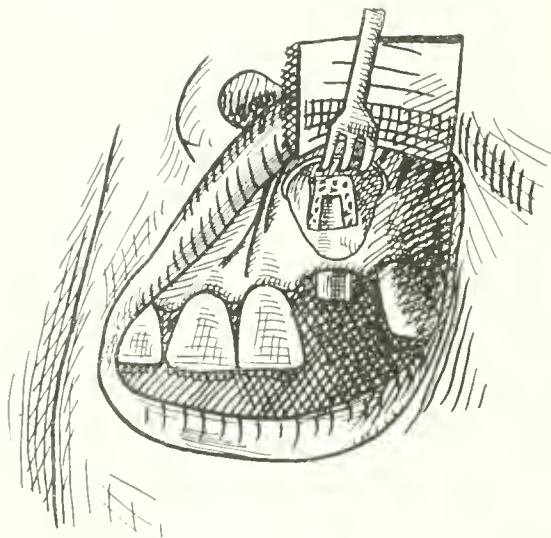


Fig. 12. Apex Amputation: After removal of the Root Apex and curetting of the Abscess Cavity.

ROOT AMPUTATION.

Root amputation can be performed on all teeth, but especially on single-rooted teeth. The operation is easier in front of the mouth, and becomes difficult towards the back.

It is indicated: (1) In all cases of chronic alveolar abscesses, where the root is affected, absorbed, or gangrenous. (2) In cases of well-fitting crowns and bridge abutments, instead of removing the bridges, to treat periapical infections. (3) On roots, which cannot be filled properly on account of obstructions, curving or branching of the root canals, at the apical region. (4) On roots, which have been perforated at the apical part by root canal instruments. (5) To remove instruments broken off in the end of the root canal.

Treatment of the root canal. The root canal should be treated with antiseptics, and can be filled before or during the operation. I prefer to have it

filled before the operation. After sterilizing the root canal with iodine, I secure a germ-proof and tight-sealed filling, by the use of a thin mixture of a phosphate cement, with which the canal and gutta-percha point, before inserting, is moistened. It also has to be properly condensed, to adhere closely to the walls of the canal.

Anesthesia. Conductive anesthesia is used combined with the infiltration method, using the high percentage of *Suprarenin* for the latter, to get anemia of the field of operation. But either method can be used alone. To make the operation entirely painless, the labial as well as the lingual side of the alveolar process should be anesthetized (Figs. 8 and 9).

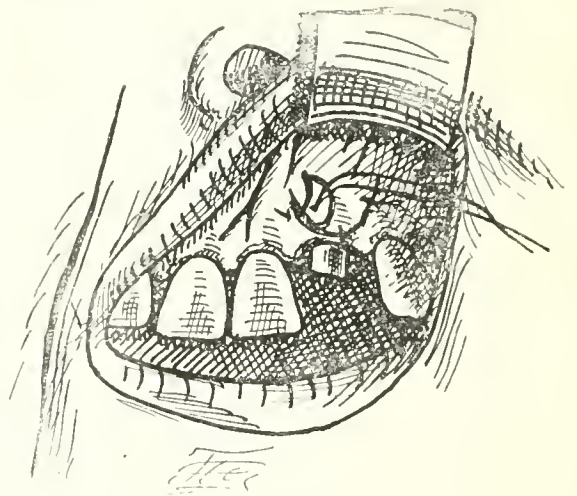


Fig. 13. Apex Amputation: Suturing the wound.

Radiograph. While waiting for the anesthesia to take effect, we can take a second radiograph in order to ascertain the extent of the root canal filling. The first was taken to diagnose the case.

Operation. The operation should be performed with all aseptic precautions. The saliva ejector should be used to remove the saliva, and sponges properly placed to protect the field of operation. I consider it of the greatest importance that the operator wear a mask, to eliminate also this source of infection of the wound.

Incision. Have the assistant retract the lip, and paint with tincture of iodine. Make a half-round incision through the gum and periostum. Separate the flap from the bone with the sharp periosteal, raspatorium. Insert the sharp retractor and have the assistant hold it (Fig. 10).

Amputation of the root apex. The alveolar process is now visible, if it has not been destroyed. A good-sized opening is cut with chisel and burr

to obtain a good view of the apical one-third of the root. Resect the root with a fissure burr at a point not further down than the extent of the root filling, as shown in the radiograph, and far enough to remove all parts which are denuded or gangrenous. Remove the resected root part with a spoon excavator (Fig. 11).

Curettage of the cavity. The most important part is the removal of the granulum and the curetting of the alveolar process with a round burr, or a curette, until healthy bone is visible on all sides (Fig. 12).



Fig. 14.

Fig. 15.

Fig. 16.

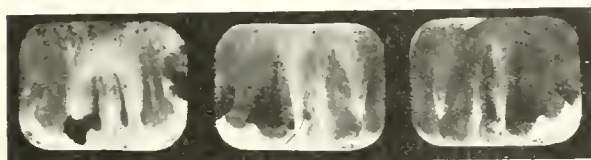


Fig. 17.

Fig. 18 (Reversed).

Fig. 19.

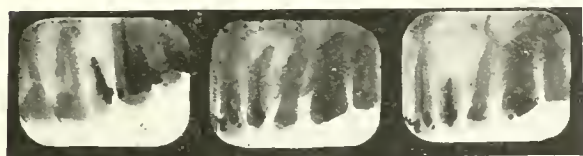


Fig. 20.

Fig. 21.

Fig. 22.

Treatment of the wound. Remove carefully all sharp points and smooth the margins. Then wash with normal salt solution to remove all the debris. Sponge and sterilize the whole cavity with iodine one part, alcohol two parts. Stimulate bleeding with a suitable instrument and after the cavity is filled up with a blood clot, draw the flap over the opening and sew it back carefully with horsehair stitches (Fig. 13). The healing occurs by organization of the blood clot. If proper aseptic care has been taken a good union is obtained in a very short time. The stitches are removed after three days, and if horsehair has been used this causes little or no discomfort. In my mind the sewing in the mouth is of the greatest importance. The wound heals by first intention and leaves only a small scar. The packing of the wound with medi-

cated gauze gives chance for new infection, often leaves an ugly scar or depression, and is principally an excuse for, or safeguard against, an operation, which has not been performed under the precautions of modern asepsis.

RADIOGRAPHS OF PRACTICAL CASES

CASE I. Patient suffered from chronic alveolar abscess with sinus for several years. Antiseptic treatment from the root canal for eight weeks gave no result. Patient was referred to me for amputation and curetting. Fig. 14 shows the periodontal abscess at the ends of the two upper incisors. Fig. 15 shows the teeth after the root canals have been filled. Fig. 16 was taken directly after the operation. Fig. 17, six days after the operation.



Fig. 23.

Fig. 24.

Fig. 25.



Fig. 26. (Reversed)

Fig. 27.

Fig. 28.



Fig. 29.

Fig. 30.

CASE II. Patient has a chronic blind abscess at the root of the upper incisor. When cleaning the calcified root canal, the end of the root was perforated at the side. Fig. 18 shows abscess condition with instrument extending through the perforation. Fig. 19, the root canal filling emerging through the perforation. Fig. 20, after the operation.

CASE III. Chronic abscess at the root of the upper first bicuspid with sinus. Fig. 21, case before the operation. Fig. 22, case after the operation.

CASE IV. Patient was referred to me for amputation of the apex of the upper cuspid root. This tooth was valuable, as it supported one abutment of a large bridge. Fig. 23, radiograph for diagnosis (note enamel drop under the free part of the bridge). Fig. 24, after root canal filling. Fig. 25, after the operation.

CASE V. Fig. 26, radiograph showing the condition immediately after amputation of the lower bicuspid root (this radiograph was taken on the wrong side of the film). Fig. 27, radiograph showing the condition after two years (note formation of new bone).

CASE VI. Patient was referred to me with the history of a broken root canal instrument in the tooth. Fig. 28 shows the abscess and the broken-off instrument in the apical part of the tooth, distal to the root canal filling. Fig. 29, after amputation of the root apex, which contained the instrument and curetting of the large abscess cavity.

CASE VII. Fig. 30 shows amputation of both roots of a lower molar after the operation.

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19 EXETER ST., COR. COMMONWEALTH AVE.

Medico-Legal Aspects of Anesthesia and Analgesia.

DAMAGES FOR HOT-WATER BOTTLE BURNS UNDER ANESTHESIA.

A number of decisions, pro and con, have been rendered in respect to damages for hot-water bottle burns under anesthesia during 1914. In

Chilley vs. Bradford,

Victor Chilley, a student of the Royal College of Music, London, was awarded damages of 100 pounds, on account of the negligence of a qualified nurse, acting as the servant of the proprietor of the nursing home, in allowing him to be burned about the legs and feet by a hot-water bottle, while unconscious from an anesthetic, after a nasal operation. The burns were so severe that they necessitated his remaining at Dr. Bradford's some ten weeks. Dr. Bradford himself was found by the jury personally not guilty of any negligence. (*Lancet*, January 31, 1914.)

Reeves vs. Lutz.

In this case the St. Louis, Mo., Court of Appeals held that a verdict for \$1,500 damages to a husband for the loss of his wife's services, companionship and society, as a result of a hot-water bottle burn under anesthesia, and permitting the wound to heal over a drainage tube, was not excessive. The burn occurred during the patient's post-anesthetic recovery after an operation for cancer; although the hot-water bottle had been wrapped in a towel, and rested against the patient's leg, which was covered by a flannel operating garment.

The court held that the application of the hot-water bottle for two hours, without investigating its effect, constituted negligence. As there was no evidence in this case justifying the theory of accident, and as the defendant and expert witnesses testified that burns are frequently inflicted in such a manner, then the precepts of ordinary skill and care required the defendant to anticipate this possibility.

Lindler vs. Columbia Hospital.

In deciding the first case in the state on the question: Is a hospital with a charitable foundation liable to patients for injuries caused by the negligence of employees? the Supreme Court of South Carolina affirms a judgment for damages in favor of the plaintiff, who was burned by a hot-water bottle while under the influence of an anesthetic.

While the court admitted that the specific injury in this case might have been due to inadvertence, still it contended that a strong declaration of liability was necessary under the circumstances, to cover the underlying principle involved; absolute immunity from the results of criminal as well as careless negligence, on the part of employees of a hospital which could secure a charitable foundation. Moreover, the court held that, while a trust fund could not legally be diverted to a purpose other than that for which it had been created, under the circumstances, as the charitable foundation called for the relief of suffering, it was only consistent with strict justice for such a fund to repair the evil of its own doing. (81 S. E. R. 512.)

Stewart et al. vs. Manasses, Pa.

The plaintiff in this case was non-suited by the Supreme Court of Pennsylvania, on the grounds that a family physician who recommends a patient to a hospital for operation and merely acts as an assistant at the operation, cannot be mulcted of damages for burns from a hot-water bottle while the patient is recovering from the anesthetic, as this negligence was directly traceable to the attending hospital nurse, for whose negligence the attending physician could not be held responsible. (60 Atl. R. 574.)

ALLEGED NEGLIGENCE IN ADMINISTER- ING AN ANESTHETIC TO A SCHOOL CHILD.

In this case of *Davis vs. London County Council*, heard by Mr. Justice Lush, sitting with a common jury on January 27, 1914, an infant scholar at a County Council school, suing by her father as next friend, sought to recover damages for alleged negligence in the administration of an anesthetic;

it being alleged that when the plaintiff was undergoing an operation at the Islington Medical Treatment Center, under control of the defendants, the anesthetist had carelessly allowed some of the A. C. E. mixture to come in contact with her face, with the result that she suffered great pain from the burn thus inflicted and would be permanently disfigured.

The defendants contended that they had entered into an agreement with the Islington practitioners (under the Educational Acts, 1907), whereby the association was to provide premises, while the London County Council was to have administrative control of the work. The Council was also to select an anesthetist and four surgeons from a list of doctors, nominated by the association, and was also to supply one or two nurses to be present as assistants at operations. The Council was to have power to refuse cases, and would contribute to the association's funds an amount determined by the number of half-day's work done by the doctors.

Under such an agreement the court held that the doctors performing the operation or administering the anesthetic were not the servants of the Council, and the jury found a verdict for the defendants. (*British Medical Journal*, February 7, 1914.)

CORONERS' INQUESTS OF DEATHS UNDER ANESTHETICS.

The vexed question of whether it is desirable in the interests of the public that inquests should be held in all cases of death under an anesthetic, was reopened during 1914 by Dr. F. J. Waldo, coroner for Southwark, London, who has contended before that inquests in these cases are beneficial in affording an opportunity, if not for censure, at least for admonition. On representation from Dr. Waldo's court, one of London's largest hospitals, recently overhauled its antiquated system of administering anesthetics, increasing the number of visiting anesthetists and also materially decreasing its previous anesthetic morality.

At the inquest mentioned, Mr. T. I. Brend, an anesthetist to Guy's Hospital, while admitting that the verdict of Dr. Waldo's court had subserved a useful purpose, held that the anesthetist, summoned to give evidence, suffers in many ways. While coroners may possess considerable medical knowledge and forensic acumen, it would be difficult for the best of them to differentiate between deaths, due solely to the use of an anesthetic, and those resulting from depressed vitality or the unavoidable collapse incident to the surgical trauma of the operative procedure. The obvious factor in all deaths on the table is the anesthetic, although the

patient may have been given his last chance of life in a hopeless condition.

It is difficult also for an anesthetist in a coroner's court to belittle his responsibility without subjecting the operator to a share in the impending opprobrium. In every coroner's case the anesthetist is practically put on trial for an offence, and his evidence is not infrequently controverted by that of the pathologist, who knows nothing of the clinical aspects of the case. Coroner's inquests were originally intended to ascertain whether a person died as a result of crime, accident or natural causes, and the countless number of successful anesthetics should make the few deaths, which loom so large in the coroner's court, a negligible factor.

Also any effort on the part of the coroner's court to appraise the merits of the technical side of anesthesia, would only result in the expert anesthetist foregoing all hazardous risks, certainly a deplorable outcome. While, undoubtedly, there is improvement in the conduct of anesthesia in the larger hospitals, still the publicity, which classes every death on the table as an anesthetic fatality, simply serves to engender panic in the public mind, regarding a phase of surgery, which is far safer than the risk incurred by the operative procedure itself.

In cases of wanton carelessness in the administration of anesthetics, or in their use for criminal purposes, there is room for prosecutions for manslaughter; but few coroners will be able to make the verdicts of their juries subserve the same useful purpose which Dr. Waldo's have accomplished. Undoubtedly the laws regulating coronial investigation of deaths under anesthesia should be changed or reinterpreted. (*Lancet*, January 31, 1914.)

FEATURES IN THE JULY SUPPLEMENT

The Use of Music During Analgesia:

W. P. BURDICK, M.D., Kane, Pa.

Fifteen Years Experience with Ethyl Chloride as a General Anesthetic:

MARTIN W. WARE, M.D., New York City.

Nitrous Oxid Anesthesia in Labor:

ARTHUR E. GUEDEL, M.D., Indianapolis, Indiana.

Ethyl Chloride as a General Anesthetic for Dental Surgery:

MAURICE GREEN, D.D.S., New York City.

American Journal of Surgery

QUARTERLY SUPPLEMENT of ANESTHESIA and ANALGESIA

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F. HOEFFER McMECHAN, A.M., M.D., Editor
Cincinnati, Ohio, U.S.A.

Vol I. No. 3. APRIL 1915.

"So God empal'd our Grandsire's (Adam's) lively look,
Through all his bones a deadly chilness strook,
Siel'd up his sparkling eyes with Iron bands,
Led down his feet (almost) to Lethe's sands;
In brieft so numm'd his Soule's and Bodie's sense,
That (without pain) opening his side from thence
He took a rib, which rarely He refin'd,
And thereof made the mother of Mankind."

THE FUTURE OF ANESTHESIA AND ANALGESIA.

THE MEN WHO HAVE ACHIEVED SUCCESS ARE THOSE WHO HAVE WORKED, READ AND THOUGHT MORE THAN WAS ABSOLUTELY NECESSARY, WHO HAVE NOT BEEN CONTENT WITH ABILITY SUFFICIENT FOR THE PRESENT NEED, BUT ALSO HAVE SOUGHT ADDITIONAL KNOWLEDGE AND STORED IT AWAY AS AN EMERGENCY RESERVE. IT IS SUPERFLUOUS LABOR THAT EQUIPS A MAN FOR EVERYTHING THAT COUNTS IN LIFE. (Davis.)

Could any editorial text carry a more potent message?

Among Davis' successful men may certainly be numbered those surgeons and anesthetists who have participated in the advancement of the science and practice of anesthesia and analgesia since their inception. While their unselfish efforts have so far resulted in noteworthy progress, there are still many problems to be solved before anesthesia and analgesia will really achieve their predestined birthright.

Such organizations as the American Association, the London, New York, Scottish and Providence Societies of Anesthetists, while they are milestones in the right direction of establishing anesthesia and

analgesia as specialties, they do not begin to cover the ground, and State or Interstate Associations, along similar lines and for the same purpose, must shortly follow, if present progress is to be steadily maintained.

Likewise medical schools in America and on the continent must be thoroughly impressed with the necessity of having the science and practice of anesthesia and analgesia taught by experts who have made the study and use of these adjuncts of modern surgery their life work.

Also hospital trustees should be compelled to protect the lives of patients entrusted to their care, by having all general anesthetics administered by or under the supervision of staff- or visiting-anesthetists.

In this connection it is imperative that the Medical Practice Acts of the various States be so amended as to abolish the present menace of the nurse-anesthetist, and that medical associations should question the ethical standing of those surgeons who persist in employing lay-anesthetists, in the presence of competent, licensed practitioners, who are ready to undertake the work and shoulder its full responsibilities.

Again, until medical and dental associations provide facilities for post-graduate work in these specialties, for those who are anxious to perfect themselves in the very latest advances of anesthesia and analgesia, they cannot consistently protest against those commercial concerns that are advertising and providing such opportunities.

In conclusion, it seems needless to reiterate that the journalistic medium which provides surgeons, dentists and anesthetists with a vehicle for the publication of their original researches and an interchange of their latest practices, should be enthusiastically supported, so that its efforts to advance the cause of anesthesia and improve the status of the anesthetist may be an assured success.

F. H. M.

FEATURES IN THE JULY SUPPLEMENT

The First Major Operation Under Ether in England:

F. WILLIAM COCK, M.D., F.S.A., London, England.

(Profusely illustrated with Contemporary Portraits, Scenes, Apparatus and Records.)

PROCEEDINGS OF THE PROVIDENCE
(R. I.) SOCIETY OF ANESTHETISTS.

AMERICAN ASSOCIATION OF ANESTHETISTS.

Among the papers announced for the San Francisco meeting of the American Association of Anesthetists, June 19, 1915, are the following: President's address: Nitrous Oxid-Oxygen Anesthesia in Obstetrics, Charles K. Teter, Cleveland, O.; Importance of Raising the General Standards of Anesthesia, Mary V. Madigan, Portland, Oregon; Some Basic Principles of General Anesthesia, Carl G. Parsons, Denver, Colo.; Nitrous Oxid-Oxygen Anesthesia, Mary E. Botsford, San Francisco, Cal.; Ventricular Fibrillation and Chloroform Syncope, E. H. Embley, Melbourne, Australia; Sacral Analgesia in Operations on the Sigmoid and Colon, Jerome T. Lynch, New York City; Blood Pressure Under General Anesthesia, E. I. McKesson, Toledo, O.; Personal Experience with Anoci-Association, Wallace Irving Terry, San Francisco, Cal.; Accidents During and Following Anesthesia, Isabella C. Herb, Chicago, Ill.; Intravenous Use of Colloidal Gelatin Solutions in Hemorrhagic and Texemic Shock, James J. Hogan, San Francisco, Cal.; Intratracheal Anesthesia (Apparatus), Saxton Temple Pope, San Francisco, Cal.; L. Rockey will also present a new apparatus; The Evolution of Modern Anesthesia, Roland E. Skeel, Cleveland, O. Headquarters and Assembly Room will be in the St. Francis Hotel. A Morning and Afternoon Scientific Session will be followed by a banquet in the evening. For further information address

JAMES T. GWATHMEY, M.D., Secretary,
40 East Forty-First Street, New York City.

Book Reviews

A carefully selected library is essential to a thorough knowledge of the science and practice of a specialty.

Local Anesthesia in Dentistry. With Special Reference to the Mucous and Conductive Methods. A Guide for Dentists, Surgeons and Students. By Professor Dr. Guido Fischer, Director of the Royal Dental Institute of the University of Marburg. Translated by Dr. Richard H. Riethmüller, of the Dental Department of the Medico-Chirurgical College, Philadelphia. Large octavo, 244 pages, with 115 engravings (mostly colored) and 2 plates. Cloth, \$4.00, net. LEA & FEBIGER, Publishers, Philadelphia and New York, 1914.

Fischer has achieved the distinction of having almost all other writers on the subject of local anesthesia in dentistry either quote him extensively or base their practice on his fundamental investigations and researches. Braun, Allen and Gwathmey pay him the compliment of being the authority on the subject. Those who have been familiar with Fischer's volume since the *First German Edition*, and have appreciated its valuable developments in succeeding editions, will be delighted with Professor Riethmüller's translation, which is really not so much a translation, after all, as a collaboration. Fortuitous circumstances which threw the author and collaborator into intimate association have resulted in an *American Edition* that challenges the excellencies of the original. Fischer's demonstrations before representative American dental institutions and Riethmüller's presentation of his text have established novocain-suprarenin anesthesia as a successful routine practice in dentistry in the United States.

In his revision Riethmüller has spared no pains to con-

dense and revise the text, and to incorporate many changes and improvements based upon the most authoritative knowledge and the best and most practical procedures. The instrumentarium and the technic of making accurate and safe solutions have been improved and simplified, and the methods and points of injection have been even more fully elucidated and illustrated. Special attention has been accorded the subjects of isotonia, asepsis and conductive anesthesia, which latter method has become that of predilection with all skilled operators.

The scope of the work is simply exhaustive. No phase of the subject, historical, physiological, anatomical, or technical, has been slighted. The genius of the author is shown in his ability to teach the science and practice which he has personally mastered, and presenting each detail definitely, frankly and yet with satisfactory completeness.

The foreword on pain is followed by a brief résumé of the historical evolution of analgesia, after which a consideration of the operator's duties occasions some judicious advice regarding anamnesis and eroticism. The physical methods of analgesia are discarded in favor of the chemical with the exception of the stasis bandage. Novocain-suprarenin dissolved in Ringer's solution is the analgesic agent of choice and implicit directions are given for the preparation of various percentage strength solutions. Fischer's instrumentarium is now practically known to every dentist as well as the modified syringe holder and Ringer's flask and instrument tray suggested by Riethmüller. Iodin is preferred for disinfecting the operative field.

In the preparation of the patient the use of such sedatives as bromural or scopolamin are advocated, as are valiolol, amyl nitrite and camphor in oil for impending collapse. Opiates or trigemin are advised for postoperative pain, in association with tamponing with pure novocain powder.

The indications and contraindications of local anesthesia for various operative procedures are thoroughly discussed, especially in the relation of anesthesia to the therapy of inflammation.

In encompassing the technic of local anesthesia the underlying osteology, neurology and topography are illustrated and explained in minutiae, while the practice of mucous, infiltration, and conductive anesthesia is given in great detail.

The illustrations and color work are superb, and the mechanical features of the book are all that could be desired.

The present edition stands as the authoritative reference volume on the subject, and the SUPPLEMENT compliments itself on the fact that both Dr. Fischer and Professor Riethmüller are now on its staff of Associates, and its readers will, in the future, be given all the advances in local anesthesia for dentistry from these authorities at first hand.

Proceedings of the Royal Society of Medicine: Section of Anesthetics. Vol. vii; Comprising the Report of the Proceedings for the Session 1913-1914. LONGMANS, GREEN & Co., London, 1914.

This volume is of especial interest because it reflects the impression formed on the Continent regarding two American innovations in anesthesia—anoci-association and intratracheal insufflation. Considering the conclusions of Chaldecot and Bryan, it is apparent that anoci-association methods of anesthesia and operating will be *de rigueur* in England henceforth.

The Review of Inquests Concerning Deaths During Anesthesia, 1910-1913, submitted by Flemming for the action of the Section on Anesthetics, has already been dealt with in the OCTOBER SUPPLEMENT; but it is well worth critical analysis by those who are interested in the question of anesthetic fatalities.

The exposition of intratracheal anesthesia by Kelly, Boyle, Shipway and Pembrey, is exhaustive and timely.

The Discussion of Posture in Relation to General Anesthesia, opened by McCardie and participated in by Blumfeld, Hewitt, Waggett, Harmer, de Prenderville, Barwell, Davis, Boyle and Tilley, is perhaps the most noteworthy contribution on the subject in the annals of anesthesia;

and while readers are already familiar with an abstract of the discussion, the full report is sufficiently important to be valuable as a reference. McCardie's main contentions have been recently corroborated by means of radiographs in the experiments of Scholz.

Goodman Levy's much-quoted and discussed paper on Sudden Death under Light Chloroform Anesthesia from Fibrillation, concludes one of the most interesting volumes of the Section of Anesthetics, issued since its inception.

Oral Anesthesia: Technic and Practical Application of Local Anesthesia of the Oral Cavity in the Different Branches of Dentistry. By KURT HERMANN THOMA, D.M.D., Assistant in Anesthesia and Dental Anatomy, Harvard Dental School, Harvard University. First edition. Cloth, 142 pp., 91 illustrations, some in color. RITTER & FLEBBE, Boston, Mass., 1914.

According to Thoma, in these days of nervousness, hysteria and competition, the dentist can accomplish his work with the least discomfort to the patient, in the shortest time and with the most perfect results under the influence of local anesthesia. Hence the *raison d'être* for his volume on Oral Anesthesia.

Thoma begins his book with a concise but thorough exposition of the anatomy of the oral cavity, its osteology, neurology and topography. This portion of the text is profusely illuminated with graphic illustrations, many in color, all serving the specific purpose of preparing the tyro for oral anesthesia on a basis of anatomical accuracy.

In the section on pharmacology he elaborates on the unique value of novocain and synthetic suprarenin, preferably dissolved in Ringer's solution made from freshly distilled water. In this connection Thoma reiterates some excellent advice about the cautious use of suprarenin. His instrumentarium is essentially that of Fischer. His instructions regarding the preparation of the solutions for injection are given with painstaking detail, and, in no small measure, account for the routine successful results of his methods.

Pursuing the subject he discusses in their every phase the technics of surface, infiltration, conductive and ganglion anesthesia, illustrating his technic in a most novel manner by showing the position of the needle in its relation to the bony, neural and dental structures by means of radiographs. This innovation in illustrating is perhaps the most valuable feature of Thoma's book.

Due consideration is given to the various causes of analgesic failures and to the management of complicating ill-effects of oral anesthesia. In conclusion, Thoma makes the practical application of his advocated technic to the many exigencies of operative dentistry, crown and bridge work, exodontia and oral surgery.

The volume stands as an excellent working manual for not only the progressive dentist, but also for the general surgeon who is interested in oral anesthesia.

Practical Anesthetics with Nitrous Oxid and Oxygen.

By Edward S. Barber, D.D.S. Cloth, Octavo. First Edition, 305 pp.; 87 illustrations, some in color; thumb-indexed. NATIONAL DENTAL PUBLISHERS, Chicago, 1914.

Barber dedicates his book to those whom he has instructed, and his volume bears evidence that he has mastered his subject, not only by personal research and clinical experience, but also by teaching it. His title is well chosen because his special technics of nitrous oxid-oxygen analgesia and anesthesia are the result of individual development.

In his description of apparatus Barber limits himself to a consideration of the Clark device, as with it he has achieved his own success. His details regarding its use are exhaustive and eminently practical; so much so, in fact, that even the tyro in anesthesia and analgesia should be able to profit by them. In this connection, also, he explains the advantages of certain mechanical improvements in gas-oxygen apparatus, such as pressure reducing control of the gases, centrifugal mixing of the nitrous oxid and oxygen, warming of the vapor, associated etherization and the technical details of oral and nasal administration.

His chapter on the Preparation of the Patient, in which he considers especially the anesthetic risks involved in the presence of certain complications, such as billiousness, coryza, bronchitis, or pneumonia, intoxication, fear, exophthalmic goitre, circulatory disturbances, and a previous bad anesthetic history, is filled with valuable advice with regard to handling these hazards with safety.

Special attention is given to the position of the patient in the chair to facilitate the dentist's work as well as to prevent inconvenient movements. The jiu-jitsu tricks for controlling obstreperous patients are not only harmless, but effective, and should really be practiced so that the dentist can use them instantaneously in meeting any emergency.

The latest methods of resuscitation are discussed and attention drawn to the use of carbon dioxide in association with oxygen perfilation to combat the condition. Also the discriminate use of stimulants and sedatives is advocated.

In his chapters devoted to Analgesia and Anesthesia proper, Barber dilates not only on the technic of administration, but also fully explains the use of the accessory instrumentarium, which is a valuable feature. The Team-work between Operator and Assistant is given due consideration, as are also those esthetic factors which make the taking of an anesthetic pleasant and recovery therefrom without untoward incident.

As a whole Barber's book is a satisfactory working manual and is as *practical* as the title infers.

Society Proceedings.

Membership in a society devoted to your specialty is an essential to success.

INTERSTATE ASSOCIATION OF ANESTHETISTS.

The Interstate Association of Anesthetists will hold its organization meeting, in conjunction with the Ohio State Medical Association in Cincinnati, O., May 4-5, 1915, at which time the following elaborate scientific program, devoted exclusively to recent advances in anesthesia and analgesia, will be presented:

Foreword, Dr. Robert Carothers, Ohio State Medical Association Councillor; Selection of the Anesthetic, Emmett F. Horine, Louisville, Ky.; Nitrous Oxid-Oxygen Anesthesia in Obstetrics, Arthur E. Guedel, Indianapolis, Ind.; Blood-Pressure under General Anesthesia, E. I. McKesson, Toledo, O.; Conductive Analgesia for Intra-oral Operations, Hugh MacMillan, Cincinnati, O.; Alkaloidal Medication in Relation to Anesthesia and Analgesia, Isabella C. Herb, Chicago, Ills.; Anesthesia for Brain Surgery, Charles K. Teter, Cleveland, O.; Use of Music During Anesthesia and Analgesia, W. P. Burdick, Kane, Pa.; Magnesium Sulphate Narcosis, D. D. DeNeen, Cincinnati, O.; Ethyl Chloride Anesthesia, R. A. Rice, Columbus, O.; Intravenous Anesthesia, C. L. Candler, Detroit, Mich.; Preparatory, Operative and Postoperative Precautions for Hazardous Genito-Urinary Risks, Moses Salzer, Cincinnati, O.; Vapor Anesthesia for Intraoral Surgery, Paul R. Coble, Indianapolis, Ind.; Local Anesthesia for Hernia Operations, Charles T. Souther, Cincinnati, O.; Surgical Mortality from the Standpoint of the Anesthetist, H. W. Kearney, Washington, D. C.; Nitrous Oxid-Oxygen Analgesia in Dentistry, Edward S. Barber, Chicago, Ill.; Posture and Muscular Relaxation as Factors in the Newer Conception of Shock, Willis D. Gatch, Indianapolis, Ind.; Spinal Anesthesia, John Overton, Tulsa, Okla.; Acapnia, E. M. Sanders, Nashville, Tenn.; Anesthesia—a Full-Fledged Specialty, W. Hamilton Long, Louisville, Ky.; Anesthesia, Anesthetists and Workmen's Compensation Laws, F. H. McMechan, Cincinnati, O.; Intratracheal Insufflation Anesthesia, B. Merrill Ricketts, Cincinnati, O., with Demonstration of a Portable Field-Apparatus by Major Allie Williams, U. S. A., Washington, D. C.

Headquarters, Assembly Room and Exhibits will be in the New Hotel Gibson, in which all the Sections of the Ohio State Medical Association will also meet. An in-

formal organization dinner will be served on the evening of May 4, and later the visiting anesthetists will be the guests at a Smoker of the Local Committee headed by Dr. E. O. Smith. Visiting ladies will be entertained by Dr. Nora Crotty and her committee at a reception and theater party.

Anesthetists, surgical and dental, as well as interested surgeons and general practitioners, are cordially invited to attend. For further information and dinner reservations address

F. H. McMECHAN, M.D., Sec'y.,
1044 Wesley Ave., Cincinnati, O.

SCOTTISH SOCIETY OF ANESTHETISTS.

The first meeting of the Society was held in Edinburgh on the 18th of April.

The President, Dr. C. A. McAllum, in the Chair.

After the transaction of private business, including the final drafting of the Rules, the President read his introductory address entitled: "False Anesthesia." In the course of his remarks he defined this condition as differing from true anesthesia in that if the patient suffers any trauma, such as an incision with the knife, he at once exhibits active reflexes, moves or cries out, although his appearance has been that of true anesthesia. The condition is met with either during the induction period or during the course of operation—very rarely after the administration has stopped. The chief signs during induction are as follows: shallow respiration, cyanosis, flaccid muscles, absence of corneal reflex, contraction of the pupil, staring appearance of the eye, and a free secretion of thin saliva. If the condition arises during the operation the signs are similar, save that the pupil is dilated—the appearance thus closely corresponding to the condition of overdosage. Both forms occur much more commonly with chloroform than with any other anesthetic.

As to its causation he believed that since it arose mostly in the hands of those who encouraged the patient to breathe very deeply during the induction stage, that the condition was largely one of apnoea. He also considered that in some cases the respiratory mucous membrane and cornea itself were in a condition of partial local anesthesia. The diagnosis was at once important and difficult, for there were risks of reflex shock if the patient was incised while in this condition, which yet so closely resembled true anesthesia. He considered that the method of taking the corneal reflex was a prime factor in making the distinction. The usual method of lifting and fixing the upper lid with one finger, while touching the cornea with another finger, at the same time observing whether the lower lid twitched, was a very rough one. A far more delicate test was the brushing of the center of the cornea, and observing whether the upper lid closed down upon the eye. Taken in this way the corneal reflex would usually distinguish between the two conditions.

With a view to guarding against false anesthesia he strongly deprecated the encouragement of exaggerated breathing on the part of the patient in the very early stages, while during the close of the induction period he stimulated both the lips and the front of the chest with a view to encouraging deeper and fuller respiration.

ABSTRACT OF THE DISCUSSION.

DR. PATON BOYD did not commonly see the condition. He agreed with Dr. McAllum that the ordinary method of taking the corneal reflex was faulty.

DR. TORRANCE THOMSON (Edinburgh) also practically never encountered the condition, as he hardly ever used chloroform.

DR. LAMB (Victoria Infirmary, Glasgow) hardly thought that the title which the President had chosen for his paper quite accurately indicated the condition which he described; and which seemed to be rather an apparent but not real state of dangerously deep anesthesia. In the past he had looked upon "False Anesthesia" as exemplified by the condition, met with most frequently in children, in which all the ordinary signs of a moderate anesthesia were present—regular respiration, absence of corneal reflex, contracted pupil, flaccidity, etc.—but in which the slightest operative interference or even the forcible pinching of the skin at once elicited movement or phonation,

and in fact woke up the patient. The term "False Anesthesia," as applied to this condition, might be otherwise described as "Anesthesia Sleep." The condition described by the President could be ascribed to a too light anesthesia and the apparently dangerous signs to the depression resulting from impending sickness, Dr. McAllum having mentioned sickness as a frequent and immediate sequel to the condition. In the past Lamb had looked upon it as the cause of the condition, but he would take every opportunity of observing future cases from this other point of view.

DR. J. JOHNSTON (Aberdeen) agreed that the condition was a clinical entity. He, however, believed with Dr. Lamb that some cases, which, according to the essayist, would fall under the class of "False Anesthesia," were really cases of impending vomiting.

DR. ARTHUR MILLS (Dundee) was particularly interested in two points which Dr. McAllum emphasized, namely: (a) the relative frequency of the occurrence of this condition when the patient had breathed in a forcible manner early in the induction period, and (b) the fact that while in this state of spurious anesthesia the patient frequently secreted an abundant flow of clear saliva. So far, he had only observed the latter phenomenon in children and had then found it to be a frequent precursor to laryngeal crowing once true anesthesia had been obtained. He was so convinced of the frequency of the condition that he invariably discouraged, in adults, unnatural forcible respiration at the commencement of the administration. He had only observed the condition of false anesthesia during the induction period. The condition which Dr. McAllum described as occurring during the course of the operation was difficult of differentiation from a state of too light anesthesia with impending vomiting, and naturally was frequently observed after the administration is stopped. As regards causation, Mills was inclined to attribute the phenomenon to a dilation of the splanchnic area and consequent cerebral anemia. Culminating often in vomiting, this act itself mechanically remedied matters, emptying the abdominal vessels and flooding the brain with blood. In testing the corneal reflex he found the lower lid movement of great value, especially when the reflex was nearly gone. His impression was that slight lateral movement of the lower lid toward the nose can frequently be elicited after the upper lid has apparently ceased to respond.

DR. FAIRLIE (Glasgow) questioned the theory of the local anesthetic action of chloroform on the respiratory mucous membrane in the production of false anesthesia. In his experience the condition, although common in children, was not common in infants under two years of age, the very class of cases in which a local anesthetic action would be expected. False anesthesia seemed to him to occur more frequently as a sequel to fear or nervousness during the induction of anesthesia.

DR. ROSS (Edinburgh) saw the condition rarely, as he used ether so much more commonly than chloroform, but he agreed that it did exist, and that it was difficult to diagnose. The method of taking the corneal reflex described by the President was first brought to Dr. Ross's notice by the writing of Bellamy Gardner, and he believed it to be the only proper one. He considered that weak percentages of chloroform were a likely cause of the condition. The condition of the pupil was a very striking one and did not resemble that of any proper degree of chloroform anesthesia. It suggested to him some unusual degree of the internal secretion of adrenalin.

DR. McALLUM replied briefly, maintaining that the condition, when arising during operation, was different from that of merely impending vomiting, but he considered that vomiting was a common sequel of the condition and usually terminated it.

INHALATION METHODS OF ETHERIZATION APART FROM INTRATRACHEAL INSUFFLATION.

In the discussion of this subject, DR. PATON BOYD spoke of his own methods. He always had given to the patient the previous night a dose of veronal and half an hour before the operation a hypodermic of sulphate of atropin. He objected to the use of morphia. He began with the

Ormsby Inhaler, which he had used for many years, and which no one had been able to convince him was really antiquated. He remembered Dr Carter Braine remarking to him that it was a big man whom you could not overcome with a bottle of ether and a bath sponge. He used the sponge dry and on it placed first of all 5 c.c. of ethyl chloride. At the end of a minute the patient was well under and he then added ether to the sponge. The patient should be well under in five minutes, and after another few minutes he was usually able to discard the closed inhaler and turn to the open method. He never found it necessary to prop open the mouth nor to use a tongue forceps save in emergencies. He did not consider that the induction by the closed method seriously increased the after vomiting, though he admitted that the use of ethyl chloride did occasionally lead to some trouble in this respect. As regards the scope of ether he thought it met the great bulk of cases, but he had not gone the length of entirely discarding chloroform from his practice, believing that young children, elderly or stout persons, usually took it better than ether.

Dr. J. H. GIBBS (Edinburgh) held that the irritating properties and unpleasant smell of strong vapors of ether made it undesirable to induce anesthesia with it, and it was consequently very important to discuss how best to guide the patient through the first stages of anesthesia, particularly in view of what should be taught to students.

The ideal method would be one that quickly and safely rendered the patient unconscious and that did so with absolutely no unpleasant sensations, so that the patient could say afterwards, "I just went to sleep."

The desiderata of speed and safety were very satisfactorily found in nitrous oxid and in ethyl chloride; but the factor of the patient's comfort depended very much upon the administrator, whatever drug was chosen.

During the last few years, in particular, it has become the custom to inject atropin with or without some narcotic, prior to inducing anesthesia. In Gibbs' opinion, this should be done in all cases of general anesthesia that are to last more than a few minutes, and even in some cases of "single dose" anesthesia, no matter what anesthetic was used. He did not know of any class of cases where atropin, in a suitable dose, was inadmissible. With regard to narcotics such as morphia, there were circumstances where its use was contra-indicated, but although he preferred to use it, it was not by any means so essential as atropin.

Dr. Gibbs also referred to the use of the terms "open" and "closed" ether, which he thought essentially bad, because misleading. These terms have led to the assumption that an anesthetist who used an inhaler with a bag was necessarily making use of a closed method and was more or less asphyxiating his patient, and that the man who uses a mask with gauze was using an "open" and therefore "non-asphyxiating" method, no matter how much the patient might be smothered up with lint, wool, or towels. The truth of the matter was that "open" ether anesthesia did not exist, and that it was just as easy to give ether with an inhaler and bag, provided a large bore apparatus was chosen, and as satisfactory in every respect as to give it with a mask. In every case a certain minimum percentage of ether vapor must be presented to the patient in order to allow sufficient ether to circulate in the blood for the induction and maintenance of anesthesia. Now, the minimal dose should also be the maximal one, and really the only objection to a "closed" apparatus was the ease and safety with which the minimal dose might be exceeded, and the ease with which air deprivation might take place. This, however, was not the fault of the large-bore apparatus, but of the anesthetist, in not using it properly.

Passing on to the question of induction, while ether was very unsuitable owing to its unpleasantness, it was eminently safe. In the choice of any drug, the fact must be taken into account that there are some people who object to the application of a facepiece. They are, however, a very small number, and there are very few indeed who cannot be persuaded to allow a facepiece to be used by a few minutes kindly explanation and the promise that it shall be allowed merely to touch the face without resting upon it. If persuasion is of no avail, anesthesia is started with chloroform, and before the patient loses conscious-

ness, increasing quantities of ether are added until a mixture of two parts of chloroform and three parts of ether is reached to carry the patient well into the second stage. The mask and mixture are then discarded for a large bore inhaler, such as Hewitt's. In this way chloroform is discarded at a period prior to that at which any danger can arise from it.

In the vast majority of cases, however, the best routine practice is to induce anesthesia with nitrous oxid or chlorid of ethyl. For the average adult probably nitrous oxid is the better, but as a matter of fact, owing to the difficulty of carrying it about, ethyl chlorid is most available. Ethyl chlorid, if properly administered, while possibly not quite so safe, is no more unpleasant to take than nitrous oxid, and shares with that drug, though in far greater degree, the advantage of rapid induction. In considering the best means of induction, rapidity combined with safety is a very important factor, because it not only curtails the period of greatest distress to the patient, but in busy hospital practice it saves much valuable time. The maximum dose necessary is 3 c.c., and for children and fragile patients about half that quantity. The ethyl chloride is put into a graduated glass tube which is connected to the apparatus by a piece of red rubber tubing which slips on to a metal tube with a universal joint on the bag-mount.

In use, the face-piece is lightly applied to the face of the patient with one hand, and while talking encouragingly to him, a cup, half full of nearly boiling water, is brought for a moment just in contact with the bottom of the tube of ethyl chlorid. When the gentle boiling of the ethyl chlorid is passing off, the hot water is again applied until in ten or fifteen seconds the patient is so muddled as not to object to the remainder of the ethyl chlorid being rapidly evaporated by a continuous application of the hot water. The object in view is to present the strongest vapor the patient will accept without showing any sign of discomfort. Should the patient show any such sign, the hot water is withheld until what has been already vaporized has had time to deepen the degree of analgesia already obtained, and it is then again cautiously applied to the tube. After all the ethyl chlorid has been evaporated, the patient is allowed to continue breathing it for three or four respirations before the ether is turned on. Here, too, the anesthetist can save himself trouble and shorten the period of induction by attention to details. In many cases the reflexes of the patient are still more or less active, and he must be carried on into full ether anesthesia without arousing inconvenient ones. This can be readily done by presenting a very weak vapor during inspiration and a much stronger one during expiration. To do this, the patient's respirations are observed and the pointer is turned nearly half way during expiration, and back to *nothing* for the succeeding inspiration. After a few such respirations the pointer can be advanced to *three-quarters* for expiration and to *one-quarter* for inspiration, then to *full* for expiration and to *half* for inspiration. At this stage the patient is sufficiently anesthetized to allow the pointer to be slowly moved on from *half* to *full*, irrespective of inspiration or expiration, and the anesthetist must then determine by the usual signs whether the patient is ready for the surgeon to begin operating.

Induction by means of nitrous oxid is carried out much in the same way. Greater care, however, should be taken to be sure that the patient is unconscious before the ether is admitted. From the time that ether is turned on, no more nitrous oxid or nitrous oxid and oxygen, as the case may be, should be given, as the object is gradually to saturate the gaseous contents of the bag with ether vapor. When the patient is nearly anesthetized, the nitrous oxid may be squeezed out of the bag and the patient allowed to replace it with air, by the anesthetist lifting the face-piece during an inspiration and applying it during expiration.

Dr. Ross considered the difference in result between a closed and an open method, as caused not so much by the rebreathing of the closed method, but by the fact that most inhalers do present some obstruction to the flow of the respiratory current. Hewitt's wide bore inhaler was introduced with a view of minimizing this objection. Applied upon one's own face without putting ether into the

chamber, so long as the indicator is at 0 there is no perceptible check, but as soon as it is moved over, a distinct obstruction to respiration can be felt. Obviously the obstruction in the Ormsby Inhaler is less than in any other closed apparatus, and it is worthy of trial in certain cases where the open method does not give a sufficient deep anesthesia. Dr. Ross always used a small dose of morphia with the atropin. He maintained that it was just as bad to use none as it is to use large doses. As regards pleasant induction, Ross has tried all methods. The open ethyl chlorid—ether sequence described by Hornibrook—gave very good results, but sometimes led to serious after vomiting. In many cases, and in particular, of women, open drop ether induction was quite possible, and was as pleasant to the patient as any other method. But in strong men chloroform in some form was usually indicated. Personally, Ross used it in the form of $C_2 E_3$ to carry the patient to the degree of light anesthesia. After that, anesthesia was continued by drop ether entirely, using practically the methods of Bellamy Gardner, with the addition of a towel folded up to form a hood in front of the mask. This was frankly copied from the Ferguson inhaler, with which he had not, for some reason, had entire success. The mouth prop was usually essential towards securing free respiration and really good muscular relaxation, but it seemed barbarous habitually to clip every tongue according to Bellamy Gardner's routine. Ross has never succeeded in bringing his quantities of ether per hour down to the low level indicated by American anesthetists. Six to seven ounces during the first hour, including the induction, was his average, with three or four for the second hour.

DR. TORRENCE THOMSON always used the open method, given by his own inhaler, which had been elsewhere described. The large dose of morphia or morphia and scopolamine which he formerly favored he did not now use. Small doses of morphia with atropin gave better results. The great bulk of all cases could be dealt with by open ether, and even in the induction stage chloroform was rarely necessary. He had entirely abandoned closed inhalers. He agreed with Dr. Ross that the quantities of ether necessary to secure an anesthesia deep enough for the views of the British surgeon were much greater than those published by American anesthetists. He did not think that this increased in any way the after suffering of the patient. He never clipped the tongue forward, but he sometimes left in a Doyen's gag, packing the shank round with gauze to prevent leakage of ether vapor.

DR. DAVID LAMB (Glasgow) was of the opinion that when time was no object the administration of ether by the *open method* was the most pleasant and the most satisfactory, both during and after the administration.

When time had to be considered, ether given by a Clover apparatus, either alone or preceded by nitrous oxid or chlorid of ethyl was of course quite satisfactory, but he thought that a more gradual induction of anesthesia gave the best results in abdominal work.

His practice in such cases had been influenced by the fact that when he first used ether he had to fight against a very strong prejudice on the part of the surgeons in favor of the *quiet anesthesia* of chloroform. Ether mixed with chloroform, $C_2 E_3$, in most cases fulfilled the requirements of the patient, the surgeon and the anesthetist, though now with the further developments in abdominal work, the mixture should be given until the stage of excitement was past, then chloroform, until deep anesthesia was obtained; thereafter, *open* ether or chloroform according to the requirements of the case.

Physiologists state that the administration of ether sensitizes the heart muscle and that the subsequent administration of chloroform is dangerous. Clinically Lamb has found that ether always stimulates the heart and that if chloroform is given subsequently with reasonable care, allowance being made for the more rapid respiration and the consequent more rapid intake of the drug, there was less danger than when ether had not been used.

When administering chloroform Lamb always felt more comfortable when the heart had previously been, as it were, *primed* with ether, either alone or in mixture.

DR. JOHNSTON (Aberdeen) objected to the use of mor-

phia, save in selected cases. He generally used chloroform as the inducing agent, but found open ether very satisfactory for the bulk of cases after the induction period.

DR. A. MILLS used an inhaler somewhat resembling the Ferguson instrument, with which he found many cases required no chloroform at all, though many did.

DR. HOWARD JONES (Edinburgh) protested against the term *open* ether when small admixtures, even as low as one in ten of chloroform, were being used.

DR. GIBBS in his reply said he did not believe there was any such thing as *open* ether. In his judgment the Hewitt instrument caused no obstruction in respiration and the results, both immediate and remote, were all that could be desired.

JOHN STUART ROSS, M.D., Hon. Sec'y.

AMERICAN ASSOCIATION OF ANESTHETISTS.

The Second Annual Meeting of the American Association of Anesthetists was held at the Hotel Chelsea, Atlantic City, June 22, 1914. President James T. Gwathmey called the meeting to order, and after a reading of the minutes of the 1913 meeting at Minneapolis, the following officers were elected for the ensuing year:

President, Dr. Charles K. Teter, Cleveland, O.; Vice-Presidents, Dr. Willis D. Gatch, Indianapolis, Ind.; Dr. T. Drysdale Buchanan, New York City and Dr. Mary V. Madigan, Portland, Oregon; Secretary-Treasurer, Dr. James T. Gwathmey, New York City; Executive Committee, Dr. F. W. Pinneo, Newark, N. J., and Dr. W. C. Woolsey, New York City.

A number of candidates were then elected to membership.

A communication from Dr. F. H. McMechan, Cincinnati, O., outlining in detail a prospective Supplement of Anesthesia and Analgesia, to be incorporated in the AMERICAN JOURNAL OF SURGERY, was read, and after a discussion by Dr. A. H. Miller, Providence, R. I., and Dr. James T. Gwathmey, the Association voted to adopt the Supplement as the official organ for the publication of its transactions.

During the two scientific sessions that followed, papers were read by Dr. F. W. Pike, Columbia University, New York City; Dr. H. Warren Buckler, Baltimore, Md.; Dr. F. W. Nagle, Montreal, Canada; Dr. James F. Mitchell, Washington, D. C.; Prof. Charles Lieb, Columbia University, New York City; Dr. George W. Crile, Cleveland, O.; Dr. Karl Connell, New York City; Dr. James T. Gwathmey, New York City, and Dr. Wayne Babcock, Philadelphia, Pa.

There was a liberal attendance of anesthetists from all parts of the United States and Canada, and quite a complement of interested surgeons and physiologists.

The meeting was concluded with a banquet at the Hotel Chelsea in the evening.

The next meeting of the Association will be held in San Francisco during the Panama-Pacific Exposition, at a date just prior to that of the American Medical Association, June 19.

Index and Abstracts

A Résumé of the International Current Literature of Anesthesia and Analgesia.

EDITOR'S NOTE: Authors of pertinent articles, who desire to have them indexed and abstracted, are cordially invited to send copies of the journals containing their contributions, direct to the editor, immediately on publication. Also the receipt of reprints for filing and reference will be duly appreciated.

ANESTHESIA. J. Blumfield, London, Practitioner, November, 1914.

ANESTHESIA, PRACTICAL. W. N. Lynn, Knoxville, Tennessee State Medical Journal, November, 1914.

ANESTHESIA, SUGGESTED REMOVAL OF A SEBACEOUS CYST, UNDER. J. W. A. Cooper, Lancet, January 23, 1915.

- ANESTHESIA CHART, SUGGESTION OF CLOCK DIALS ON. F. St. Clair Reilly, Havre, Mont., Journal of the American Medical Association, January 16, 1914.
- ANESTHESIA IN GYNECOLOGY. H. Schlumpert. Archiv für Gynaekologie, CIII, Nos. 1, 2, 3.
- ANESTHETICS. (Ueber Schmerzstillende Mittel.) M. Kochman, Therapeutische Monatshefte, October, 1914.
- ANESTHETICS, SELECTION OF, SEQUENCES AND METHODS. F. W. Nagle, Montreal, Canadian Medical Journal, December, 1914.
- ANOCI-ASSOCIATION IN STOMACH AND GALL TRACT SURGERY. George W. Crile, Cleveland, O., Lancet-Clinic, February 27, 1915.
- ANOCI-ASSOCIATION ANESTHESIA AND SHOCK. A. M. Fauntleroy, U. S. Naval Medical Journal, January, 1915.
- ANOCI-ASSOCIATION. C. A. Pannet, British Journal of Surgery, October 11, 1914.
- ANTINOXI-ASSOCIATION. N. Rosenwasser, Cleveland, O., Lancet-Clinic, January 30, 1915.
- APPARATUS—A PORTABLE POSITIVE-PRESSURE APPARATUS FOR THE ADMINISTRATION OF ETHER BY INTRATRACHEAL INSUFFLATION. Allie W. Williams, U. S. A., Washington, D. C., Journal of the American Medical Association, January 9, 1915.
- APPARATUS—FIELD AND HOSPITAL APPARATUS FOR LOCAL ANALGESIA ON A LARGE SCALE. P. Kuhn, Deutsche Medicinische Wochenschrift, October 22, 1914.
- APPARATUS—A NEW APPARATUS FOR NITROUS OXID-OXYGEN ANESTHESIA. Albert H. Miller, Providence, R. I., Journal of the American Medical Association, October 24, 1914.
- BLOOD, ACIDITY OF, INFLUENCE OF INHALATION ANESTHESIA ON, AS DETERMINED BY THE H-ION CONCENTRATION. George W. Crile, Cleveland, O., Annals of Surgery, January, 1915.
- BRACHIAL PLEXUS, BLOCKING OF, 110 CASES. H. Boit, Beiträge zur Klinische Chirurgie, XCIII, No. 2.
- CHLOROFORM ANESTHESIA. J. Stewart, Halifax, N. S., Canadian Medical Journal, December, 1914.
- CHLOROFORM POISONING, CASE OF DELAYED. H. P. Fairlie, Lancet, December 19, 1914.
- CHLOROFORM POISONING, LATE, RESISTANCE OF PUPS TO, IN ITS RELATION TO LIVER GLYCOGEN. E. A. Graham, Chicago, Ill., Journal of Experimental Medicine, February, 1915.
- CONDUCTIVE ANESTHESIA. J. E. Nyman, Dental Register, November, 1914.
- CONDUCTIVE ANESTHESIA, THE TECHNIC OF. Theodor Blum, New York, The Dental Summary, February, 1915.
- DEATHS—FACTORS DETERMINING MORBIDITY IN SURGICAL CASES. C. W. Moots, Toledo, O., American Journal of Obstetrics, November, 1914.
- DEATHS—SYNCOPE AND FATAL ASPHYXIA UNDER NITROUS OXID-OXYGEN ANESTHESIA. H. C. Luke, New York Medical Journal, January 30.
- DENTAL ANESTHESIA, EDINBURGH SYSTEM OF. J. Stuart Ross, British Dental Journal, May, 1914.
- DENTAL PRACTICE, NITROUS OXID ANALGESIA IN GENERAL. E. B. Prentiss, New York, Dental Cosmos, February, 1915.
- Dentistry, Operative, Anesthesia and Its Relation to.** W. D. DeLong, Reading, Pa., *The Dental Cosmos*, February, 1915.

In presenting this subject to the Pennsylvania State Dental Society, DeLong found, after a canvass of 200 dental offices, that 37 per cent. were equipped with the latest models of nitrous oxid-oxygen outfits, an indication that dentists were taking a renewed interest in the use of anesthesia and analgesia for operative dentistry. In this connection DeLong was of the opinion that while the ingenuity of dentists and manufacturers would solve the various problems involved in perfecting the anesthetic apparatus, still it must not be forgotten that no mechanical device could ever replace the sight, hearing, analysis, judgment, decision and skill of the accomplished anesthetist. Irre-

spective of apparatus, *skill* is the paramount requisite for success in the conduct of anesthesia and analgesia. The use of nitrous oxid-oxygen also enabled the dentist, by relieving his patients of pain, to do better operative work in a much shorter space of time. DeLong also pleaded for more instruction in the present methods of conducting anesthesia and analgesia, and rather deplored the fact that much of this instruction filtered through the channels of the dental supply houses.

In discussing this phase of the subject, Reithmüller, of Philadelphia, was vexed that all the iniquities of dentistry were habitually charged against the dental schools and manufacturers. In his opinion, dental schools gave careful courses in anesthesia and analgesia, and there were also opportunities for special courses and post-graduate work. He hoped that the action of the Academy of Stomatology of Philadelphia along these lines would be followed all over the country by State and local dental organizations, and until such societies instituted courses in anesthesia and analgesia, they could not consistently slur the efforts of commercial houses in meeting this demand of their patrons, particularly when the instruction provided by them was in the hands of experts holding diplomas from the most reputable dental colleges.

ETHER, ITS INFLAMMABILITY AND EXPLODABILITY; ITS ADMINISTRATION AND EFFECTS ON LUNGS AND KIDNEYS. L. F. Schummaus, Alexandria, Indiana, State Medical Association Journal, December, 1914.

ETHER IN MEASURED DOSAGE, THE ROUTINE ADMINISTRATION OF. Albert H. Miller, Providence, R. I., *International Clinics*, Vol. 4, Series 24.

Etherization; Its Influence on General Tuberculous Peritonitis. W. E. SAVAGE, Cincinnati, O., *Lancet-Clinic*, February 6, 1915. (Case Report.)

Savage recounts a case operated on six years ago, for probable perforating appendicitis, in which the exploratory incision revealed a condition of general tuberculous peritonitis. The abdomen was closed without further interference and drainage. The patient made an unexpected and surprisingly rapid recovery and is to-day, apparently, completely restored to health. The only notable feature of the operative procedure was that the induction stage of etherization, by the closed-cone method, was unduly prolonged on account of the patient's shallow breathing, due to the tympanitic condition of the abdomen.

Savage is of the opinion that the result accomplished was due to the minimum amount of oxygen in the body during etherization or to the indirect action of the anesthetic agent. The bacillus of Koch is not only aerobic, but first cultures are difficult to obtain, even the presence of an excess of oxygen. This may account for the fact that the bacillus is seldom found in the tuberculous area proper, but rather in the more vascular structures limiting the tuberculous process. The bacillus in the body, however, gradually adjusts itself to a decreased oxygenation; although acute exacerbations of the tuberculous process are precipitated by surgical interference and exposure of the parts to atmospheric air, as in the opening of a psoas abscess. Granting that deoxidation would most materially influence the activity of the bacillus, clinical observation should record the greatest benefits from deprivation of the oxygen supply, in acute cases, such as tuberculous meningitis, peritonitis and miliary tuberculosis, and this contention coincides with routine experience.

While in the closed cone method of etherization the amount of ether introduced into the circulation is not necessarily excessive, the supply of oxygen is reduced to a minimum. The case reported had a tuberculous peritonitis of one week's standing. When etherized by the closed cone method, the bacilli in her body were bombarded for a very considerable time with a medium practically devoid of oxygen. In short, Savage is of the opinion that the bacilli were asphyxiated. Experimental work along this line has been begun by Prof. Wherry of the Pathological Department of the University of Cincinnati Medical School, and readers of the Supplement will be given the results of his investigations as soon as they are concluded.

- INTRATRACHEAL ANESTHESIA, CASE OF RETROPERITONEAL EMPHYSEMA FOLLOWING. S. D. Ehrlich, Medical Record, November 24, 1914.
- INTRATRACHEAL AND ENDOPHARYNGEAL ETHER INSUFFLATION ANESTHESIA. J. H. Evans, Buffalo, N. Y., New York Medical Journal, January 30, 1915.
- INTRATRACHEAL ADMINISTRATION OF CHLOROFORM. W. D. Mart, Lancet, November 7, 1914.
- INTRATRACHEAL METHOD OF ETHER ANESTHESIA. R. L. Jones, Lancet, November 7, 1914.
- LOCAL ANESTHESIA. F. D. Austin, Charlotte, N. C., Charlotte Medical Journal, January, 1915.
- LOCAL ANESTHESIA IN HERNIA OPERATIONS. C. P. Knight, Stapleton, New York Medical Journal, December 5, 1914.
- LOCAL ANESTHESIA IN HERNIA AND OPERATIONS FOR LACERATED PERINEUM. R. Duffy, Tampa, Fla., Lancet-Clinic, December 20, 1914.
- LOCAL ANESTHESIA, HYOSCIN AND MORPHIN AS A PRELIMINARY TO. L. M. Hurd, New York, Laryngoscope, November, 1914.
- LOCAL ANESTHESIA IN SURGICAL OPERATIONS. A. L. Fleming, Bristol Medico-Chirurgical Journal, September, 1914.
- LOCAL ANESTHESIA, VAGINAL OPERATIONS UNDER. E. Ruge, Muenchener Medicinische Wochenschrift, December 22, 1914.

Local Anesthesia in the Prevention of After-Pain and Shock. A. E. HERTZLER, Kansas City, Mo., *Journal American Medical Association*, December 5, 1914.

Hertzler justly points out that in the presence of preliminary morphinization, the after-pain complained of, consequent to general or local anesthesia, is about the same. It is really the narcotic that accounts for the post-operative well-being of patients. Those who have been operated under both methods prefer local anesthesia because they have escaped the unpleasantness of taking ether. The after-pain following novocain analgesia and nitrous oxid-oxygen anesthesia (without morphin) is about the same, although occasionally the local analgesia will be complicated by postoperative areas of hyperesthesia, too often disregarded by the operator because he fails to comprehend their importance. The analgesic properties of novocain are very evanescent, while those of quinine in combination with urea, have a prolonged obtunding effect, particularly if inflammatory tissue can be avoided, and regional nerve-blocking utilized. Thus, while injections above an individual pile may cause exquisite pain, injection of the pile itself will be followed by a prolonged analgesia. The value of sacral blocking by means of quinine-urea, for operative procedures in the ano-perineal region and lower pelvis cannot be too highly recommended as an effective means of controlling postoperative pain, although the question arises whether such prolonged obtunding of the nervous structures may not effect the healing of the tissues.

The routine use of local analgesia is teaching operators what tissues are especially painful, and if constriction of such painful tissues is avoided, postoperative pain is negligible. This applies to stitching such viscera as the gall-bladder, folding of round ligaments, ligation of nerves and particularly tight suturing of the skin. The parietal peritoneum is very sensitive and requires delicate suturing, while the fascia, freed from its prefascial fatty tissue, may be sufficiently firmly sutured to take the strain from the underlying peritoneal approximation. Nerves, accompanying arteries, should not be caught in the ligature. This is particularly essential in ligating the superficial branches of the deep epigastric vessels in operations for hernia. Caution must be exercised in obtunding with quinine-urea hydrochlorid, as too intensive injection may cause a slough or may delay the healing of the tissues.

Enthusiasts err, who maintain that local analgesia obviates shock. It may diminish shock, but surgical traumatism necessitated by certain operative procedures, particularly in the vicinity of sympathetic plexuses, will precipitate shock in the entire absence of any painful sensations on the part of the patient. The abrogation of shock by block-

ing the rami communicantes, or the sympathetic solar or sacral plexuses is still in the experimental stage. In desperate operations, these shock-precipitating periods of the operation are best done under general anesthesia, preferably nitrous oxid-oxygen, with the addition of as little ether as possible, to avoid its systemic consequences in the presence of complicating acidosis from pre-existent disease.

While Hertzler agrees that anoci-association methods counteract emotional shock, he cannot subscribe to Crile's enthusiasm regarding the complete efficacy of quinine urea hydrochloride as a postoperative obtunding agent, nor does he feel that anoci-association, as cursorily practiced by many surgeons, abrogates shock. By emphasizing the changes in the brain-cells, Crile removes from the term "shock" its clinical meaning and substitutes an unproved histologic hypothesis. In many of the gravest operative procedures it is impossible to obtund the inflammatory or malignantly degenerated tissues, and the prevention of shock in these cases must depend upon the deftness of the operator, his ability to judge conditions correctly in order to manage them with the least possible traumatism in the shortest time and with the least loss of blood.

- MAGNESIUM SULPHATE NARCOSIS, TREATMENT OF TETANUS WITH. W. Weinstrand and E. Unger, Berliner Klinische Wochenschrift, October 19, 1914.
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Sacral Anesthesia. KARL E. SCHLOESSINGK, Freiburg, Germany, *Illinois State Journal*, February, 1915.

Speaking before the Anesthetic Congress recently held under the auspices of the Chicago Academy of Medicine, Schloessingk stated that in the Freiburg Clinic they were using the sacral anesthesia technic developed by Laewen with considerable success in operative procedures in the ano-perineal and genital regions.

The injection is made with the patient in the sitting posture, with the object of retaining the analgesic agents in contact with the dural sheaths as long as possible. The point of puncture lies in the center of an imaginary vertical line drawn from the apex of the sacral triangle to its base. The hiatus sacralis and sacral cornua assist in the localization. A skin wheal is first raised, then the sacral membrane is pierced by the needle, which is slowly insinuated along the sacral canal, being carefully guided along the curves. Having reached a depth of 6 cm., 20 c.c. of a 2 per cent. novocain solution with sodium bicarbonate and sodium chloride, and 5 drops of 1:1000 adrenalin solution, should be very slowly injected, from 2 to 5 minutes being consumed. Accidental injection into a vein will usually result in almost immediate respiratory embarrassment; while too concentrated a solution or too rapid an injection may accelerate the pulse and precipitate giddi-

ness, vomiting, or even collapse. Whilms recommends the preliminary injection of 20 cc. of saline solution to limit the absorption of the novocain.

The maximal analgesia is attained in about twenty minutes. Analgesia presents first between the coccyx and posterior border of the anus. From this point it spreads over the perineum and skin of the scrotum to the penis and glands, or over the vulvae and into the vagina. Analgesia may extend to the pubes and gluteal region, and as deep as the cervix of the uterus. The testicles remain sensitive. Occasionally an error in technic results in hemianesthesia. Schlimpert and Schneider have observed an extension of the anesthesia to the level of the umbilicus when using the high pelvic position to promote a higher diffusion of the injected solution. Analgesia usually persists one and a half to two hours, though the period is variable. Laewen regards the administration of more than 0.4 gm. of novocain into the epidural cavity as risky. Also preliminary alkaloidal medication is necessary.

Sciatica, Treatment of by Perineural Infiltration with Physiologic Saline Solution. W. M. LESZYNSKY, New York City, *Medical Record*, February 6, 1915. (Ibid) 1, Strauss, New York City.

Owing to the fact that Leszynsky has cured cases of acute sciatica with perineural injections of physiologic saline solution, he is inclined to attribute his favorable results to blocking of sensory conductivity or to the pressure and absorption of the fluid, producing changes in the circulation and nutrition of the perineural structures, rather than to the mechanical action of the fluid in loosening, stretching or breaking-up adhesions in the vicinity of the nerve.

His technic is as follows: During the application of the treatment the patient should lie on the abdomen with legs fully extended, and the feet projecting beyond the edge of the table. A firm pillow is rolled and placed under the lower part of the abdomen in order to favor relaxation of the gluteal muscles. For the purpose of locating the nerve the following measurements are made: A line is drawn from the sacrococcygeal articulation to the postero-external border of the great trochanter; at the junction of the inner one-third and the outer two-thirds of this line is found the spine of the ischium. One inch to the outer side of this point we locate the point of puncture. An area of the skin about 4 cm. in diameter is then painted with iodine, the point of puncture being in the center. The syringe used is all metal, holding 60 cc. It has a slip tip which allows the needle to fit the barrel directly. The needle is of steel, 12 cm. long, with a caliber of 2 mm., and provided with a sharp point, which is protected by a dull-tipped stylet projecting 1 mm. beyond the point of the needle. In puncturing the skin and subcutaneous tissue, the stylet is withdrawn beyond the cutting edge. It is then replaced, and the needle pushed in perpendicularly. When the sciatic nerve is reached, at a depth ranging from 6 to 12 cm., the patient may feel either a sharp pain radiating from the point of contact to the popliteal space or down to the foot; or, a sharp pain in the corresponding heel; or, there may occur a jerking movement of the leg; or, a sudden twitch in the calf muscles. Some patients complain only of diffuse pain in the buttock. The stylet is then removed. The syringe having been filled with sterile physiological saline solution at a temperature between 95 degrees and 100 degrees F., the fluid is rapidly injected. The quantity used is from 80 to 120 cc. The needle is then quickly withdrawn, the iodine washed off with alcohol, some collodion applied over the point of puncture, and this is covered with a small strip of sterile adhesive plaster. The patient is then instructed to lie abed and rest for twelve to twenty-four hours. No anesthetic is required. Strict aseptic precautions are absolutely essential. Soon after the injection, some aching pain with a sensation of heaviness and numbness in the limb usually follows, but this lasts only a short time. In some cases the sciatic pain in the thigh disappears within twenty-four hours, but the patient complains of pain continuing in the leg in the course of the peroneal nerve. This is often promptly relieved by an injection of 15 to 30 cc. in the region of the nerve at the head of the fibula. The interval following the first injection, before another is given,

will vary according to the degree of relief obtained. He has been in the habit of waiting from thirty-six hours to one week before repeating the injection.

Lange declares that after a large experience with all of the available and conventional remedies this method has proved in his hands the most valuable therapeutic acquisition.

As a rule, the injection of saline solution under pressure, in quantities ranging from 60 to 120 cc. or more, is attended with comparatively slight pain. This usually arises during the early period of the injection. As soon as heaviness and numbness in the extremity are felt, no further pain results from the introduction of additional fluid. In the majority of instances the treatment is not painful. At the time of the first injection fear and apprehension often render some patients less manageable than others. Usually when additional injections are required, these elements of discomfort have become eliminated, and there is no further difficulty. It should be borne in mind that our object is to produce infiltration of the nerve and the surrounding structures. It is not intended that the nerve sheath should be entered by the needle. Should such a large quantity of fluid be forced into the trunk of the nerve, disagreeable consequences, such as paralysis and traumatic neuritis, would probably ensue. In the construction and use of the special needle precautions are taken to avoid puncturing a blood-vessel or the nerve sheath.

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No. 5

ANTERIOR COLPORRHAPHY AND AMPUTATION OF THE CERVIX COMBINED AS A SINGLE OPERATION FOR USE IN THE TREATMENT OF GENITAL PROLAPSE.

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The classical method of treating prolapsus uteri consists in removing a portion of the anterior vaginal wall, amputating the cervix if it is elongated or diseased, and repairing the perineum. Up to the present time no better method than this has been devised, although numerous freak operations have been suggested and tried, and though the abdominal as well as the vaginal route has been freely used, anterior colporrhaphy and amputation of the cervix are now done more successfully than was possible twenty years ago. Their technic has been improving steadily all the time, and so has that of perineorrhaphy. Indeed, these operations are now so successful that abdominal operations for prolapse may be said to be quite unnecessary.

The object of this communication is to describe two modifications which are useful in operating on the anterior vaginal wall and cervix.

In ordinary anterior colporrhaphy, the portion of the vaginal wall which is removed is oval or lozenge-shaped, the wound being broadest in its central portion and narrowing towards the cervix (Fig. 1). When this wound is sutured from side to side, tissue which was previously at the sides of the vagina is brought together in the middle line in front: the vagina is narrowed and cystocele is cured; but the operation has no special effect on the position of the uterus, which is always retroverted in cases of prolapsus. In the normal subject, the cervix is held upwards and backwards by the parametric tissue on either side of which, contains much smooth muscle and firm connective tissue. In prolapsus, the parametric muscle is atrophied and the two lateral pedicles of the uterus are elongated so that the cervix

drops forwards and downwards, the body of the uterus passing backward into a position of retroversion. To correct this surgically, it is necessary to shorten the parametric pedicles on both sides. But these cannot be cut and shortened absolutely, because they contain the main blood supply of the uterus. It is possible, however, to shorten them relatively by making them follow a longer course; in other words, by curving them forward so that

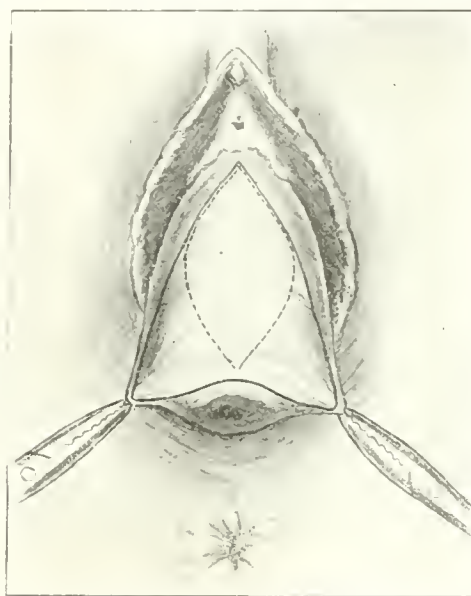


Fig. 1. Colporrhaphy without amputation of the cervix. The dotted line shows the usual incision. The plain line shows the author's incision, extending upwards and backwards on either side of the cervix.

they meet on the middle line in front of the cervix before passing on to enter the cervix laterally. If the anterior colporrhaphy wound be extended upwards and backwards on either side of the cervix onto the roof of the vagina, the wound exposes the parametrium on either side (Fig. 1). If the wound be then closed from side to side, the tissues which formerly lay at the sides of the cervix are united in the middle line in front of the cervix, which is thus pushed upward and backward toward the hollow of the sacrum. The body of the uterus at the same time passes forward into a position of anteversion, where it is kept by intra-abdominal pressure. The recurrence of prolapse is thus effectively prevented, and the operation is completed by a mod-

erate repair of the perineum done only to restore the natural size, slope, and curve of the vagina.

The anterior colporrhaphy wound is thus not an oval but a triangle, whose apex is just behind the urethral orifice and whose broad base crosses the anterior vaginal fornix just in front of the cervix. I first advocated this modification in the *Transactions of the Edinburgh Obstetric Society*, 1907-08, and have used it constantly both before and since that date, with complete satisfaction.

The operator who would secure success in operating for prolapsus must remove the cervix when it is ulcerated, badly lacerated, or hypertrophied, and when the uterus is more than three inches in length. The usual procedure is to begin the opera-

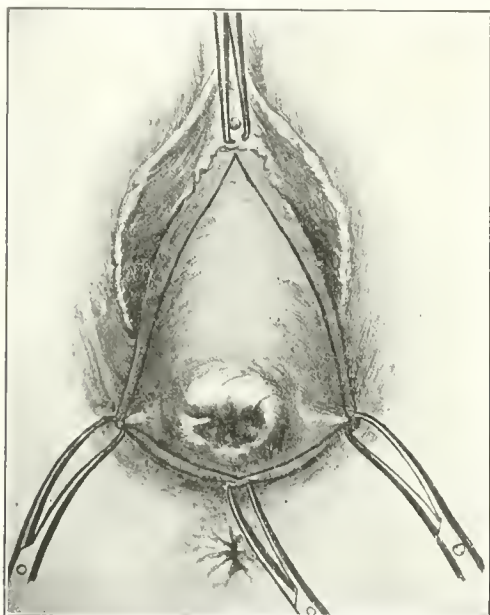


Fig. 2. Colporrhaphy combined with amputation of the cervix. The line of incision.

tion by an ordinary amputation of the cervix, leaving a transverse line of suture with the os uteri in its center. This somewhat shortens the anterior vaginal wall and so tends to pull the cervix down and forward. The next stage of the operation is an ordinary oval anterior colporrhaphy, which is not so extensive as usual, owing to the previous amputation of the cervix. Thus after the two separate operations have been done, which occupies a considerable time, the uterus is left in retroversion and the os uteri is nearer than it should be to the vaginal outlet. The perineum must then be extensively repaired and the vagina must be left very narrow indeed if recurrence of the prolapse is to be prevented.

These difficulties can be avoided by combining the two operations in one, as described by me in the

British Medical Journal, April 12, 1913. Since that date the technic of the combined operation, as done by the writer in several hundred cases, has been altered and further improved. It is now done as follows:

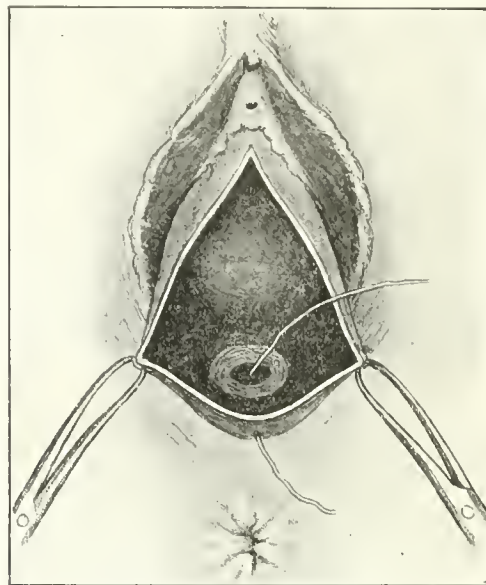


Fig. 3. Colporrhaphy combined with amputation of the cervix. The triangle of vaginal wall has been removed with the cervix in one piece. The suture has been inserted from the cervical canal through uterine wall and vaginal wall.

Pull down the cervix with a volsellum and dilate it thoroughly; measure the length of the uterus and curette it.



Fig. 4. Colporrhaphy combined with amputation of the cervix. The first three sutures have been inserted and tied. They are left long and serve as tractors until the suturing of the cervical stump is complete. The fourth suture has been inserted through the vaginal wall and uterine wall into the cervical canal.

Pick up four points with forceps, one just behind the urethral orifice, one at the junction of the cer-

vix with the posterior vaginal wall in the midline, and one on the vaginal wall on either side of the cervix. These two lateral points should be well apart, from one-half inch from the junction of cervix and vaginal wall. They should be if anything a little behind the cervix rather than in front of it (Fig. 2).

Next cut through the vaginal wall with a knife so that the incision connects the four points picked up. Beginning at the apex of the area marked out, just behind the urethra, strip off the vaginal wall enclosed by the incision from the bladder and from the paravaginal and parametric tissue; but leave it attached to the cervix. Then, pulling on the flap of vaginal wall, snip round and round the

stump begins to pass up and back toward the hollow of the sacrum. The stitches must be tied with the fingers inside the vagina; for, if enough vaginal wall has been removed, the sides of the wound will not come together unless the uterus is well within the pelvis (Fig. 6).

The remainder of the incision is closed from side to side by interrupted sutures, as the use of continuous or mattress sutures shortens the incision and pulls the cervix downward. At the end of the operation the stump of the cervix is quite out of sight, high up and far back, and the uterus is in a position of anteversion. Catgut is the only suture material, as it is impossible to get access to the parts for removing stitches after this operation.

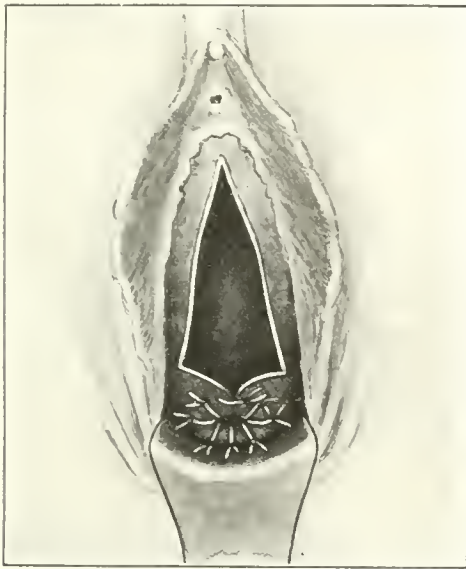


Fig. 5. Colporrhaphy combined with amputation of the cervix.

The suturing of the stump of the cervix is complete. The first suture uniting the sides of the wound has been inserted and tied.

cervix until the portion to be removed is free from its attachments.

Next cut straight across the cervix, so that it comes away together with the freed portion of vaginal wall (Fig. 3), leaving the uterus three inches long.

The first suture is passed from within the cervical canal through the back of the cervical stump and through the posterior vaginal wall in the middle line. This is tied and the second and third stitches are passed and tied one to the right, the other to the left of it, bringing the cut edge of the vaginal wall to the cut edge of the cervical mucosa (Fig. 4). When about nine stitches have been inserted the stump of the cervix is covered in and the sides of the wound approach each other in the middle line in front of the cervix (Fig. 5). By this time the

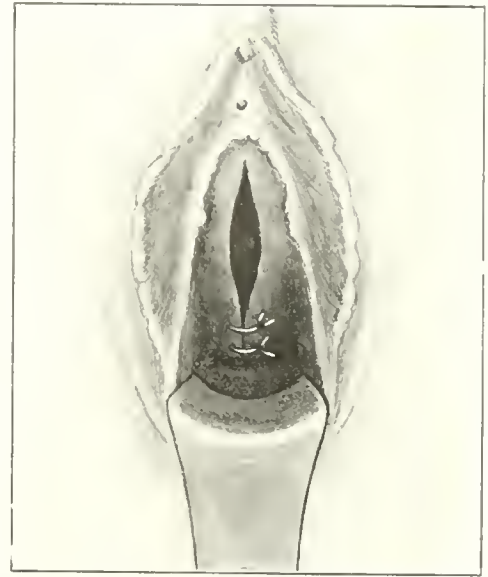


Fig. 6. Colporrhaphy combined with amputation of the cervix.

More sutures have been inserted, tied, and cut. The stump of the cervix has passed upward and backward into the hollow of the sacrum and is no longer visible. The uterus is now anteverted.

The perineum should be repaired, but there is no need to narrow the vagina. It should admit a large finger easily when all the sutures have been inserted.

Besides having the advantage of combining two operations in one, this method has given me results which are anatomically superior to those previously secured. It has repeatedly stood the test of parturition without recurrence of prolapse, and has been used upon several patients over 70 years of age. Though at first sight a difficult and rather a bloody operation, those who have done it a few times state that it is not only quicker, but also easier than the usual amputation of the cervix, followed by the usual colporrhaphy.

ACUTE AND CHRONIC INTESTINAL
OBSTRUCTION.

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It is not my purpose to consider all forms of acute and chronic intestinal obstruction, but rather some of the more important phases of the subject.

Obstruction of the bowels may be divided, primarily, into the acute and chronic forms, and the acute subdivided into those with strangulation and those without strangulation.

Acute obstruction with practically coincident strangulation occurs with especial frequency in hernia. Here the process comes on suddenly, and is attended by intense pain, nausea, vomiting, shock, quickened and feeble pulse, and cold perspiration. The pathology is represented by an arrest of the fecal current, and following this an arrest of the venous and arterial circulation. With stasis in the veins and arteries, quantities of fluid are poured into the intestines as the result of hypersecretion of the mucous membrane, from inflammatory exudate and from hemorrhage. Gases are formed as the result of the fermentation, and systemic intoxication occurs. If the bowel is not relieved in a few hours, gangrene supervenes.

In acute obstruction without primary strangulation, the symptoms come on more slowly. In these cases pain may be severe, but it is not intense; vomiting is less frequent or absent; shock is not present, and the pulse is not materially affected. The pathology here is represented by an arrest of the fecal current alone. But Kocher has shown that obstruction of the fecal current, without injury to the mesenteric vessels, soon leads to venous stasis, and in some cases to necrosis and perforation. Consequently the end-result of acute obstruction is not materially different from that of strangulation. We are well aware of the fact that in acute obstruction the intestinal microorganisms pass into and through the walls of the intestine, and may lead to peritonitis, if relief is long delayed.

The most frequent causes of strangulation and acute obstruction are hernia; bands of fibrous tissue; Meckel's diverticulum; post-operative kinking of the bowel from adhesions; intussusception; rotation of one or more coils of intestine about their axes, or one coil about a loop of intestines like a skein of yarn; volvulus; embolism of the superior mesenteric artery, or thrombosis of the superior mesenteric vein; adventitious or congenital rents in the mesentery through which a loop of bowel may pass and becomes strangulated; a dynamic obstruc-

tion as the result of paralysis of the musculature of bowel from peritonitis; and dynamic obstruction when the bowel is acutely stenosed as the result of reflex spasmodic contraction, as may occur in orchitis, during the passage of gall-stones, or urinary calculi, and in some cases of peritonitis.

A case quite recently came to my attention where strangulation was through an adventitious or congenital rent in the mesentery:

A woman 58 years of age had been complaining for a number of years of colicky pains in the abdomen, which increased and then almost disappeared. She had become greatly reduced in flesh and weakened on account of these recurring attacks, which were very severe and often confined her to bed. She had been under the care of a number of physicians, and at times the diagnosis had been appendicitis, and then duodenal ulcer, and again cholelithiasis. On December 10, 1914, I was called to see her. The night before at 10 o'clock she suffered severely from colicky pains; these increased, and at 2 o'clock her physician was called and administered an injection of morphine. At the time of his visit the greatest pain was situated in the epigastric region. The abdomen, however, was distended and sensitive. About this time she commenced to vomit, and this was continued up to the time that I saw her on the following evening. Her temperature then was 101° and pulse 110; abdomen distended, tympanitic, and very sensitive; face somewhat pinched; pulse very small and weak. As she had had a great deal of stomach and duodenal trouble in the past, and as the pain seemed to originate in that region, I thought possibly there was perforation of the duodenum.

The patient was anesthetized with ether, but during its administration respiration was suspended, and it required energetic efforts for perhaps ten minutes before respiration was fully re-established. The abdomen was then opened, and a quantity of bloody fluid evacuated. The stomach and gall-bladder were found intact. A mass was felt in the pelvis, which, when brought into the wound, was found to consist of coils of small intestine, that had passed through a slit in the mesentery, and then rotated two or three times upon themselves. The coils were black. It was impossible to reduce them without splitting up the mesentery. Then it was found that six feet of the small intestine, from the cecum upward, was involved. Hot cloths were applied for ten minutes, but the color did not improve and the circulation could not be made out in the vessels. Consequently this portion was resected, the ends closed, and a lateral anastomosis made. When the abdomen was closed, the patient was practically pulseless, but she survived until the following evening. The time of the operation was one hour and twenty minutes.

I have no doubt that these coils of intestine had been through this slit for many years, and became strangulated only when rotation occurred. I feel that if we had expedited the operation a little more,

and had not had the trouble with the anesthetic, the patient might possibly have been saved.

Obturation of the bowel: This may be defined as a condition in which there is partial or at times complete arrest of the fecal current, without interference with the circulation of the blood. Such a condition may occur with enteroliths; with gall-stones that have ulcerated their way from the gall-bladder into the intestine; with tumors situated within the bowel, or making pressure upon it from without; from cicatricial contractions; adhesions; kinking; volvulus, where not more than two-thirds of the sigmoid is involved; and at times in intussusception. I encountered a case where a loop of small intestine had been produced by adhesions and at the apex of the loop a very hard enterolith had formed, almost completely filling the lumen of the bowel.

In obturation there is increased peristalsis, colicky pain, distention, and occasional vomiting. There is also at times the passage of small quantities of fecal matter and gas.

Chronic obstruction: This is ordinarily due to the gradual narrowing of the lumen of the bowel and is usually in the large intestine. It may be due to fecal accumulations, to Meckel's diverticulum, tumors, acquired diverticulitis, cicatrices, but it is most frequently due to a carcinomatous growth.

There are certain signs and symptoms in acute and chronic obstruction to which I desire to call special attention. The first is the absence of fever for from 24 to 60 hours in practically all cases of acute mechanical obstruction. After 60 hours there will be absorbed sufficient ptomaines, toxins, or ferments to cause fever. In cases of post-operative obstruction, as well as in those of adynamic obstruction, fever will precede the signs and symptoms of obstruction.

Paralytic and dynamic ileus: Paralytic or adynamic ileus has usually been considered a result of peritonitis, the musculature of the bowels being paralyzed as the result of the inflammatory process.

Nothnagel says that no one doubts the occurrence of paralysis of the bowel as the result of either peritonitis or over-distention, but he also holds that there is a purely functional or nervous form. Van Hook, accepting this view of Nothnagel's, divides adynamic and dynamic ileus into: first, functional nervous paralysis of the intestine; second, motor insufficiency due to marked anatomic lesions of the intestine; third, embolism of the mesenteric artery, and paralysis from over-distention by gases; fourth, toxic cases due to the action of drugs or toxins; fifth, paralysis of central origin, as tabes; sixth,

reflex dynamic obstruction as from orchitis, renal colic, gall-stones, etc. Nothnagel holds that the mechanism of intestinal obstruction in these cases is as follows: There occurs motor insufficiency in the intestinal wall, with the result that the contents of the affected segments remain stationary; with stasis of the bowel contents accumulation occurs, and the bowel is successively filled from the point of paralysis upwards to the stomach.

Lichtenstein thus explains the vomiting of enormous quantities of fluid, which occasionally occurs in intestinal obstruction: The coils of intestine that have a long mesentery and are situated above the obstruction become distended with gas and fluids, and rise up towards or against the abdominal wall, while the more fixed portion, the first part of the jejunum and the duodenum, are held down to the spinal column, with the result that when the patient lies on his back the fluid contents of the intestine pass upwards into the stomach.

Diagnosis: In the strangulation or acute obstruction of a loop of a bowel in one of the external hernial openings there is usually no difficulty in the diagnosis.

Strangulation or acute obstruction within the abdomen may be diagnosed, but the actual seat or cause will be difficult to determine without exploration.

Post-operative obstruction from adhesions and kinking of the bowel usually occurs a few days after operation, where there was pre-existing peritonitis, and especially where drainage was resorted to. The condition should be differentiated from post-operative paralysis of the stomach which is of more frequent occurrence. In the latter, the epigastric region becomes greatly distended with frequent retching and vomiting. The abdomen is not distended, however, increased peristalsis is not present, and the bowels, though perhaps difficult to move, are not obstructed. Stomach lavage, restriction in stomach feeding a change of position from the back to the side or abdomen, and a few doses of strychnine will clear the diagnosis and usually cure the patient.

Intussusception is most frequent in children. It comes on suddenly with shock, vomiting, severe peristalsis, and colicky pains recurring every few moments, often with a round or sausage-shaped tumor somewhere in the large intestine, and bloody mucous discharges.

I have seen and operated upon several cases of paralysis of the bowel from embolism of the superior mesenteric artery or from thrombosis of the superior mesenteric vein, and in not a single case

was a correct diagnosis made before operation. The symptoms are those of acute obstruction. A diagnosis perhaps might be made with a more careful examination and a knowledge of the facts that embolism rarely occurs except in patients with valvular heart disease, ulcerative endocarditis, or aortic aneurism, and that thrombosis of the superior mesenteric vein is predisposed to by ulceration or septic processes in the area of origin of the vein.

Volvulus of the sigmoid is not frequent, but may occur in persons past middle life. An elongated mesentery, chronic constipation, and kinking of the sigmoid by adhesions seem to favor the rotation. These persons suddenly develop the symptoms of acute strangulation. In addition there is intense pain in the left side and a tumor.

In the differential diagnosis of obstruction, one must consider perforation of the duodenum, stomach, gall-bladder, and appendix; also acute pancreatitis, torsion of the pedicle of a tumor, and acute unilateral hemorrhagic infection of a kidney.

Chronic obstruction: This condition should usually be readily diagnosed. It occurs most frequently in persons advanced in years. There will be for months an increasing difficulty in getting the bowels to move, and when the lumen of the bowel is markedly narrowed, there occur distention of the abdomen, with tympanites, and a greatly increased peristalsis above the seat of obstruction. These contracting, stiffening, and moving coils of intestine can plainly be seen and felt in persons with thin-walled abdomens, as the peristaltic waves progress from above downwards to and against the seat of obstruction, where they break and disappear like waves against the shore. These waves recur every few minutes, and are attended with pain, often severe, and a gurgling, rushing noise. In every case in which chronic obstruction is feared, the abdomen should be uncovered and attentively observed for a few moments. In chronic cases, vomiting is not frequent, while the passage of fecal matter and gas is much restricted.

The seat of obstruction: Tavel has analyzed the symptoms of obstruction according to its seat as follows:

Pyloric obstruction: vomiting of mucus mixed at times with blood, stomach distended, pain in epigastric region, passage of gas or stools infrequent.

Duodenal obstruction: vomiting of food with or without bile and pancreatic juice, patient ejecting much more fluid than has been taken, stools and gas rare.

Ileo-cecal obstruction: vomiting not so frequent,

stools and gas absent, localized tenderness in ileo-cecal region, meteorism.

Sigmoid: vomiting infrequent or absent, stools and gas absent, meteorism very pronounced, enemas not well supported.

In my own practice I have been in the habit of relying on a few signs such as the following:

The higher the obstruction the more frequent the vomiting and the less the urinary output. If the obstruction is at the pylorus or in the duodenum, the stomach only, or the stomach and a portion of the duodenum will be distended. If the obstruction is at or near the ileo-cecal valve, the umbilical region or the center of the abdomen will be distended, while the flanks will be flat. If the obstruction is in the lower sigmoid or upper rectum, the entire abdomen will be about equally rounded out and distended. I also take into consideration the point of breaking of the peristaltic wave, which is very suggestive of the seat of obstruction.

Prognosis: According to the statistics of Goldammer, about one-third of the patients suffering from intestinal obstruction, as clinically diagnosed, can be cured without operation.

According to Naunyn, of 288 cases of ileus, 75 per cent. were saved by operation on the first or second day, and only 35 to 40 per cent. of those operated upon on the third day were saved.

Insofar as operative measures are concerned, it is a well-established fact that the earlier the operation the greater the number of recoveries.

Treatment: Strangulated hernia: Here I would advance the proposition that in case reasonably skilled surgical help can be obtained in reasonable time, taxis should not be employed. I make this proposition because: first, I believe a strangulated hernia is seldom reduced by taxis; second, taxis in the majority of cases only traumatizes an already injured intestine, lowers its vitality, and causes delay in operating. I have seen intestinal loops ruptured by taxis with death of the patient. I have seen reduction *en bloc* with death of the patient, and I have many times seen a loop of intestine so traumatized by taxis that its vitality was destroyed and resection was required.

The mortality following the operation for the radical cure of hernia is almost nil, while the mortality following delayed operations for the relief of strangulated hernia has ranged from 20 to 50 per cent. This increased mortality can be charged almost wholly to injudicious taxis, to delay in relieving the constriction, to the weakening of the patient from pain, vomiting, and inability to take food, and to toxemia.

If one succeeds in reducing a strangulated hernia, his patient must wear a truss, and each day be subjected to the risks of a re-strangulation, and probably subsequently submit to an operation for the radical cure. Why not operate at once, relieve the strangulation, perform a radical hernia operation, and cure the patient almost without risk?

For the relief of post-operative ileus I would strongly advise against delay. One of two methods may be followed: 1. Without an anesthetic or under light anesthesia a few stitches are removed and the first distended loop of intestine that presents is brought into the wound fixed and drained. In many cases after the distention is relieved the bowels commence to act through the natural channel and the fistula closes spontaneously. 2. After the abdomen is opened or in cases where it is being drained, remove the drain, flush out the wound, pass in the finger and sweep it around, breaking up the adhesions. Of course, there is some danger in drainage cases of setting up a general peritonitis, but if one follows the procedure with the employment of a cigarette drain, this will be reduced to a minimum.

Intussusception: Filling the colon with fluid or gas may be resorted to with the hope that the intussusception will be corrected. As a rule, the earlier the operation the better the chances of success. In these cases, after the abdomen is open, there should be no effort made to drag the intussusceptum out, but rather to milk it back or "back it up" from the apex.

Edward Peterson gives the following statistics (*Medical Record*, February 6, 1915):

In a study of 557 cases of intussusception, Leichtenstern placed the mortality at 73 per cent., and during the first year of life at 88 per cent.

Kock and Orrum in a study of 400 Danish cases gave the mortality in the first year of life at 60 per cent.

Clubb treated 173 cases, 16 of which were successfully reduced by enema. Of 157 cases operated upon, his results are as follows: In the first 50 cases there were 25 deaths, in the second 50 cases 12 deaths, in the third 50 cases 4 deaths, in the remaining 7 cases all recovered. In Clubb's last 50 cases, the average time from the onset of symptoms until the operation was 17 hours.

Peterson says that after 48 hours in a considerable proportion of cases the invagination is either irreducible or gangrenous and resection of the bowel or enterostomy is required. When either procedure is necessary the mortality is frightfully high.

In adynamic obstruction, repeated stomach lavage with colonic flushing will be of benefit. The treatment, however, should be preventive.

In enterospasm or dynamic ileus stomach washing and morphine in full doses should be resorted to.

In chronic obstruction, early operation—before the patient's strength is wasted by pain, loss of sleep, want of nourishment, vomiting, and toxemia—offers the only hope.

There are three points that I think should be emphasized: First, in all cases of acute obstruction purgatives are absolutely contraindicated, and can only do harm; second, in all cases of acute obstruction repeated lavage of the stomach is of the greatest benefit; third, no patient suffering from obstruction should take an anesthetic without having his stomach previously emptied. In cases where this precaution was omitted, I have seen patients practically drowned from their stomach contents while being anesthetized, and but recently, before an operation for obstruction in the sigmoid, more than a gallon of very offensive fluid was evacuated from the stomach through a tube.

In many of these cases after the stomach is emptied the distention will have been diminished greatly and the operative manipulations rendered much easier.

INTESTINAL RESECTION.

Lateral anastomosis is applicable to almost any portion of the bowel, provided only that sufficient length and mobility exist to allow of the desired arrangement of the free ends. It is the normal method of enterectomy in the large intestine, the transverse colon, the sigmoid flexure and the pelvic colon offering the only debatable exceptions.—FRANCIS REDER in *The Lancet-Clinic*.

INTESTINAL ANASTOMOSIS.

First of all, the surgeon, before he undertakes to anastomose a bowel, will see that he has an abdominal incision rightly placed and sufficiently large not to incumber him in his work. If the primary abdominal incision does not permit of a proper exposure, a supplementary incision that will meet the requirements must be made. For example, a strangulated femoral hernia will invariably demand an additional incision, the so-called working incision. Often intraabdominal conditions will reveal the intestine so fixed by inflammatory products that a supplementary incision becomes imperative.—FRANCIS REDER in *The Lancet-Clinic*.

SOME OBSERVATIONS ON MESENTERIC OCCLUSION.

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The bibliography on this subject is not extensive. Virchow first described the pathology in 1847. Welch carefully reviewed the subject up to the year

Quimby's reports note four successfully operated cases out of forty-seven operations. Wakefield in 1911 reports a successful resection of 30 inches of intestinal infarct.

The establishment of collateral circulation in most parts of the body seems easily accomplished. This is a wise and beneficent provision of nature. The mesenteric and intestinal anastomosis is larger and

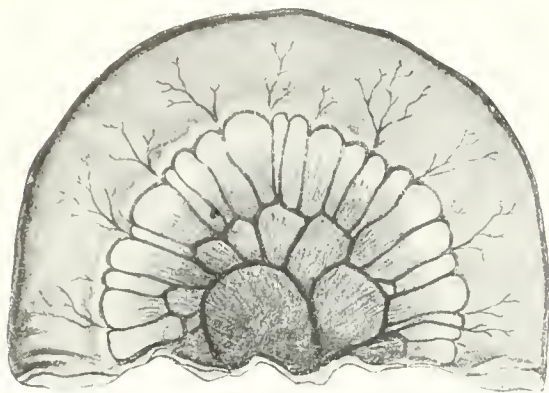


Fig. 1. Three feet from end of duodenum. Intestine twenty-three feet long (Monks). Note the system of loops formed by the branches of the mesenteric artery—primary, secondary and even tertiary. The vasa recti also provide very free communication between the terminal vessels on the surface of the bowel.

1900. As many as seventy cases of mesenteric thrombosis and embolism had been reported at that time. Gerhart and Kussmaul in 1864 had studied the clinical features. Watson and Elliot in 1895 considered fifty cases in analysis from a surgical standpoint. Welch and Mall, Litten, Faber, and others have studied mesenteric occlusion experi-

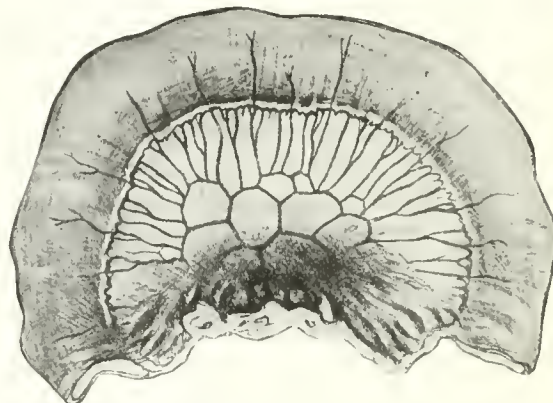


Fig. 3. Nine feet from end of duodenum. Intestine same as No. 1 (Monks).

freer than any other part of the body. It seems that here we should have most easily established a compensatory collateral circulation. If we eliminate all factors except merely mechanical occlusion, we no doubt would have a collateral circulation as easily established as elsewhere. The modifying factors are: first and most important, the presence

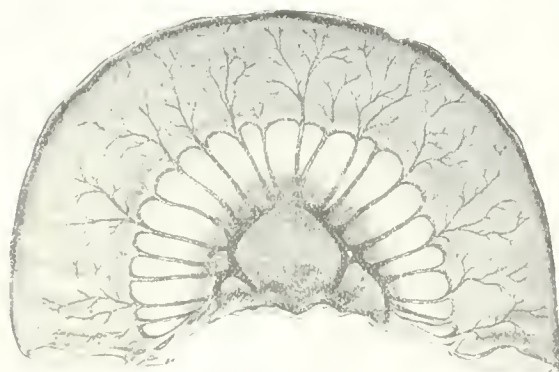


Fig. 2. Six feet from end of duodenum. Intestine twenty feet long (Monks).

mentally. The work of Welch and Mall seems the most thorough and satisfying.

Since the year 1900 there have been several reports. Jackson, Porter, and Quimby review 214 cases in 1904. Elliot's resection of four feet of infarcted intestine and Gordon's resection of two feet of infarct are the only two cases successfully operated up to the year 1900. Jackson, Porter, and

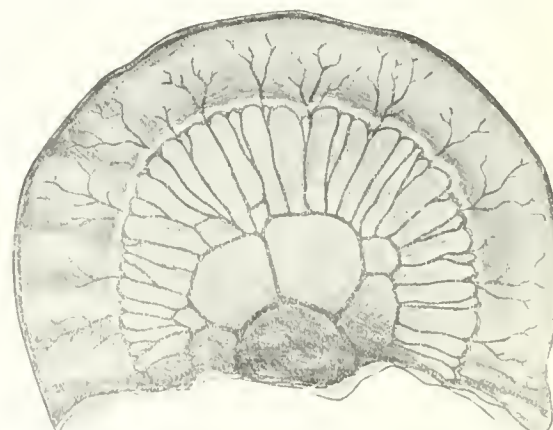


Fig. 4. Twelve feet from end of duodenum. Intestine same as No. 1 (Monks).

of infection. The other factors are the amount of mesentery occluded and the suddenness of the occlusion.

Thrombosis of either veins or arteries produces hemorrhagic infarct and consequent necrosis. Almost uniformly it is an hemorrhagic infarct. Faber has attributed the infarct to back pressure in the portal system being greater and overcoming the

pressure from the anastomosing vessels. However, hemorrhagic infarct results as readily when the mesenteric vein is thrombosed or tied. The studies of Welch and Mall are most rational and seem to furnish the best explanation of the phenomena. Their conclusions from experimenting on dogs were that the blood producing hemorrhagic infarct enters by anastomosing vessels and not by

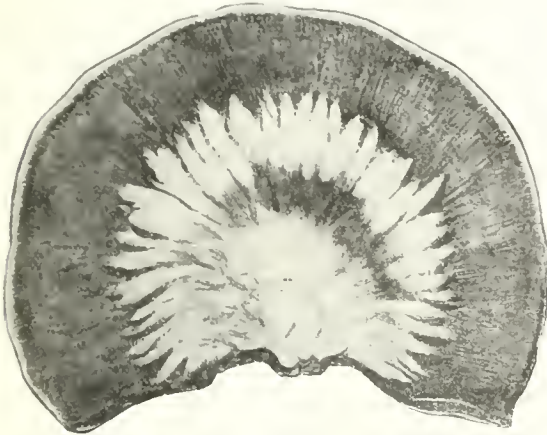


Fig. 5. Seventeen feet from end of duodenum. Intestine same as No. 1 (Monks).

reflux from the veins—that infarct is not due to demonstrable changes in vessel walls, but to retardation and stasis of the circulation, clumping the red cells in veins and capillaries and diapedesis. Another factor also is loss of lateral pulsation in the vessels. Perhaps a still more important factor

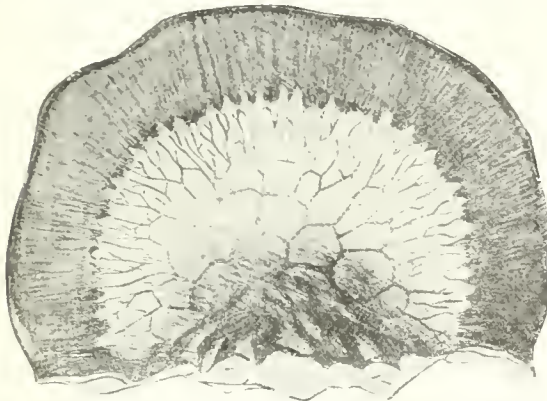


Fig. 6. Twenty feet from end of duodenum. Intestine twenty-one feet long (Monks).

is the violent tonic contractions of the intestinal walls which takes place when a vessel is occluded, producing ischemia for two or three hours, followed by relaxation and infarct. Now, why conclude that infection is the most important element entering into the establishment of hemorrhagic infarct of the intestine and mesentery? If to ischemia followed by dilatation and engorgement of vessels, stasis of current, clumping of cells, and diapedesis,

we add infection with consequent changes in the vessel walls, we account most readily for the escape of the blood-making infarct. Also infection explains more readily the progressive character of the occlusion noted in many cases. Most cases met with clinically are associated with some infec-

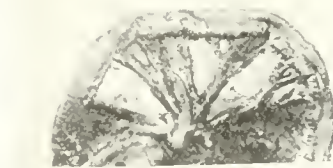


Fig. 7. Dog, No. I. Ligature around mesenteric branch near base. Pulsation ceased in two-thirds of the mesentery from cecum upward.

Photograph No. 1 taken before ligation.
Photograph No. 2 taken 15 minutes after ligating.
Photograph No. 3 taken thirty minutes after ligating.
Photograph No. 4 taken ninety minutes after ligating.
Photograph No. 5 taken twenty-four hours later. No pulsation in the tied mesentery but no infarct. Abdomen closed again. Seventy-two hours later dog died. No marked infarct or gangrenous intestine. Peritonitis and adhesions.

tive condition. Those due to embolus may be from infected emboli. The remarkable case reported by Chiene, in which the celiac axis was entirely occluded and collateral circulation established, indicates the great possibilities of compensating circulation in this region.

The great size and extensive area supplied by the superior mesenteric artery, compared with the rel-

Dog No. 2.

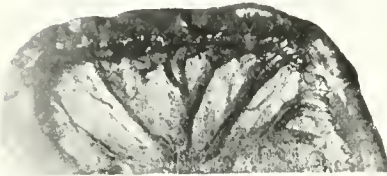


Fig. 8. Dog No. H. Tied five vasa recti about one foot from the ileo-cecal valve.

Photograph No. 1 taken fifteen minutes after opening abdomen and five minutes after tying vessels.

Photograph No. 2 taken thirty minutes later and abdomen closed. This picture shows a marker indicating where visible pulsation ceased about two inches to the right of the vessel which was not tied.

Photograph No. 3 taken after opening the dog nine days later. No infarct and no gangrene. Intestine warm but without visible pulsation. Collateral circulation seems to have been established. Ether forced to kill dog. Noted after death for thirty minutes the slow peristaltic contraction wave produced by mechanical irritation. From the point of irritation the wave slowly extending downward.

atively small inferior mesenteric, makes easily accountable an infarct when the entire vessel is occluded. A sudden occlusion with the consequent phenomena of tonic intestinal contraction for some hours would make impossible a compensatory circulation before lethal changes in cells and vessels would take place and easy infection come from the

intestinal tract. However, when we think of a branch or even several branches of the superior mesenteric itself being occluded, we wonder why there should ever be death of the part, considering the marvellous provision for collateral circulation through the numerous vessel loops in the mesentery. Such a free and large anastomosis should easily compensate for considerable occlusion. This beautiful arrangement of anastomosing vessels is provided in man and not in dogs!

What of diagnosis? A mortality of 94 per cent. would indicate that diagnosis is most easily made post-mortem. To make a reasonable tentative diagnosis would be admirable. To make a positive diagnosis would serve only to accent the egotism of the diagnostician. A picture of ileus is the most common. Sudden and intense abdominal pain, nausea, vomiting, collapse, subnormal temperature, rapid low tension pulse, rigid abdomen and distended later, perhaps bloody stools if diarrhea occurs—a picture like intestinal obstruction or intestinal perforation. The bloody stool is the most distinctive sign, but may be confused with intussusception. If given such a picture and an additional known source of embolus or a previous embolism elsewhere, we might guess a diagnosis.

The treatment of so grave a condition might be bettered by some forethought. A thorough knowledge of the anatomy and probable pathology in addition to extensive experience in abdominal surgery would be the most favorable equipment for one to have with which to meet such an emergency. A very few cases have been reported which have recovered as has been indicated. They come to us unexpectedly after a diagnosis of other trouble has been made. A resection is sometimes possible with a favorable result. Probably more often it would be wiser to simply fix the gangrenous bowel in the abdominal wound and drain as advised by Moynihan. There is no doubt that in many cases the process is progressive, and what appears at first to be a promising case disappoints because the infection and gangrene travel further.

The following two case reports are from my experience:

I. January 30, 1908. L. M., male, white, farmer, married, aged 26 years.

Family history: A brother had an appendicitis; negative otherwise.

Previous history: Last October suffered five days from an attack like the present one.

Present trouble: About 4:00 A.M. to-day, after getting up to make fires, he went back to bed and began to have severe pains in the abdomen, followed by vomiting. A physician arrived about 8:30 A.M. and made a diagnosis of acute appendicitis.

Later in the day he was moved seven miles in a spring wagon to the train and came nine miles on the railroad to the hospital. He suffered great pain all day. Received castor oil, enemas and, mor-

dix and escaped fecal concretion; also a thrombosed mesentery in the lower part of ileum. Removed appendix; resected 45 inches of ileum with end-to-end anastomosis. Drained. Wound partly closed. Shock. Proctoclysis. I saw the patient only once more, the following morning. Bedside notes indicated that the two days following operation temperature went to 99° F. He had much pain and considerable abdominal distention. Passed gas after enemas. After the second day his temperature went to 102° F. On the seventh day he had

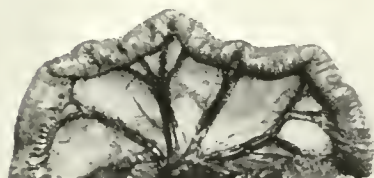
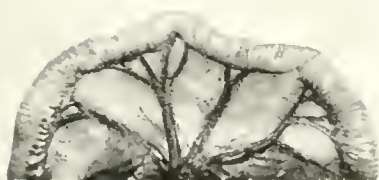
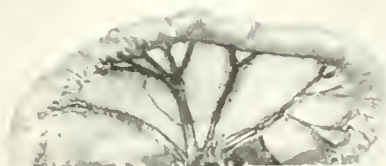


Fig. 9. Dog No. IV.

Photograph No. 1 before tying.
Photograph No. 2 taken fifteen minutes after tying.
Photograph No. 3 taken thirty minutes after tying.
Photograph No. 4 taken of infarct. The dog died about thirty-six or forty hours after time of opening. Infarcted mesentery in the lower two-thirds. The infarct was more extensive than the pulsation occluded from the ligature at first. Dog had tarry stools and bloody serum in peritoneal cavity.

phine. I saw him later in the afternoon. He had a rigid abdomen; temperature, 97° F. I made a diagnosis of perforated appendix.

Operation, 8:30 P.M. Found perforated appen-

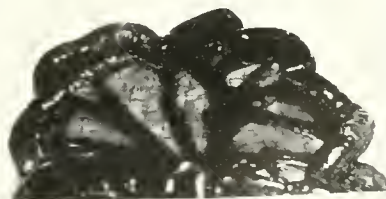
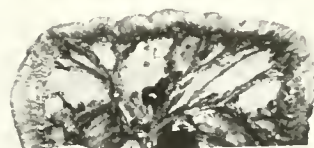
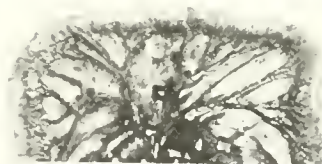


Fig. 10. Dog No. V.

Photograph No. 1 taken after tying the entire superior mesenteric artery.

Photograph No. 2 taken thirty minutes later.

Photograph No. 3 taken twenty-four hours later. Post mortem. Shows hemorrhagic infarct.

a large bowel movement and on that day a bloody serum escaped from around the rectus muscle. Next day it had a fecal odor. No fecal discharge and the finger in the wound seems to find it walled off. A loop of dark bowel in the pocket. The last two days of his illness he suffered much more pain and abdomen became more distended, pulse weakening and more rapid, dying February 9, after living eleven days. No autopsy.

July 6, 1913. F. J., farmer, male, white, single, aged 21 years.

Family history: Good.

Previous history: Always had good health, a fine physique, no injuries.

Present trouble: Tuesday, July 1, became sick after dinner. Went to his work, but had such severe abdominal pain had to quit and come home. Attributed the pain to indiscretion in eating at a party attended the night before. Called physician for relief that night. Doctor gave purgatives and bowels moved. Wednesday, 2d, had a chill. Thursday and Friday, 3d and 4th, still suffering, but was out of bed and going about some. Friday he ate some and had more pain, so went to bed again. Quite sick all day Saturday, 5th. I saw him first Sunday, 6th, 10:00 A.M.—a robust, healthy specimen of manhood, lying in bed with his knees slightly flexed and without apparent suffering. Abdomen tympanitic and tender all over. More tender to the left of the median line. Diagnosis, appendicitis and perforation. Removed to hospital and operation 3:00 P.M. Found abdominal cavity full of bloody serum. All of the intestines discolored and especially the jejunum. Looked impossible to resect. Selected the mesentery that was hard and thrombosed and the bowel which was darkest and did resect 60 inches. He died in five hours. No recovery from shock.

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ESOPHAGEAL STENOSIS: A REVIEW.

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Esophageal stenosis may be either single or multiple, congenital or acquired. Congenital atresia is rare, and usually associated with other anatomical developmental errors. Acquired stenosis may be due to (a) injury from impaction of a foreign body, (b) ulceration secondary to infectious disease, *e.g.*, scarlet fever, diphtheria, syphilis, tuberculosis, typhoid fever, etc., (c) carcinoma involving the esophagus primarily or secondarily, (d) the swallowing of corrosives, and (rarely) hot liquids, (e) pressure from enlarged thyroids, neoplasms, aneurisms, etc., (f) the so-called spasmodic or hysterical contraction—including esophagospasm and "cardiospasm." The following types of esophageal stenosis have been described: (1) linear, (2) valvular, (3) annular, and (4) tubular.

The location of the stenosis largely depends upon the manner of its production, *e.g.*, (a) when due to corrosives, the most common site is opposite the cricoid cartilage, (b) when due to ulceration following infectious disease, the lower third is most frequently involved, (c) when due to a foreign body, stenosis occurs at the site of impaction, (d) spasmodic or hysterical contraction may apparently involve any portion of the esophageal lumen, (e) when present in "cardiospasm," constriction is usually noted at the esophago-gastric orifice, (f) when due to malignant disease, pressure from neoplasms involving other organs, aneurisms, etc., the location of the stenosis naturally depends upon the situation of the occluding lesion.

From a clinico-pathological standpoint, it has been customary to classify esophageal stenosis as (1) spasmodic, (2) cicatricial or organic, and (3) malignant. Under the classification of the older writers the word "spasmodic" was utilized to represent an esophageal contraction unaccompanied by any demonstrable pathological lesion, *i.e.*, as a purely nervous or reflex phenomenon, in which there was merely an apparent inability to permit the

passage of food through the esophagus, the pronounced nervous symptoms commonly prevailing in conjunction with supposed (or possibly real) disease inducing the reflex condition, the chief cause being excitement, fear, passion, or profound emotion! Certain more recent authors also agree that true esophagospasm is without pathological basis, thus in one hundred cases of esophageal stenosis, Downie (1912) found 24 per cent. spasmodic in character, and "believes that it is due to a motor neurosis pure and simple." He admits, however, that it may be aroused by some organic lesion, and states that the "spasm usually occurs at the cardia" (cardiospasm?).

It has long been recognized that contraction of the esophageal musculature may be induced by numerous pathological lesions, but under such circumstances, inasmuch as the stenosis owes its origin to a definitely demonstrable pathology, it would be properly classified as anatomic or organic, and not as nervous or spasmodic in character. Therefore the attempt of various authors to maintain the hypothesis that the terms esophagospasm and so-called cardiospasm can be correctly applied, when there exists a definite pathological basis for the stenosis, would appear distinctly fallacious.¹ In a recent article Plummer classifies "cardiospasm" as follows: (1) primary cardiospasm (Meltzer and Mikulicz), (2) primary atony of the musculature of the esophagus (Rosenheim), (3) the simultaneous development of cardiospasm and paralysis of the circular musculature of the esophagus brought about by degenerative changes in the vagi (Krause), (4) congenital disposition (Fleiner, Zenker, Sievers), (5) primary esophagitis (Martin), (6) kinking at the hiatus esophagi, (7) gross lesions of the esophagus or stomach, such as ulcer, carcinoma, etc., (8) congenital or acquired asthenia. Liebault considers that the first step in the production of cardiospasm is an erosion in the diaphragmatic portion of the esophagus, which may be due to alcoholism, excessive use of tobacco, too highly seasoned food, the "gulping" of large pieces of food, esophageal varices, etc. He contends that erosion once formed reflexly induces esophageal spasms which in turn prevent healing of the erosion—a process analogous to that observed in anal fissure. The erosion may be so small as to easily escape observation during esophagoscopy.

The word "cardiospasm" appears to have been originated as a substitute for "idiopathic esophageal dilatation unaccompanied by anatomical stenosis,"

i.e., a spasmodic contraction at the esophago-gastric orifice temporarily preventing food from entering the stomach, occasionally accompanied by proximal esophageal dilatation. The term is now loosely employed to denote esophagospasm in any situation with or without dilatation, but specifically with reference to contraction at the esophago-gastric aperture. Whether dilatation when present is primary or secondary appears not to have been definitely determined; moreover, in many instances the so-called cardiospasm is unaccompanied by esophageal dilatation. Plummer admits that adoption of the term "cardiospasm" is premature and confusing, that the part it plays in the production of diffuse dilatation is by no means established, and there are many cases where spasm occurs at the esophago-gastric orifice without proximal dilatation.

Where esophageal stenosis is produced by causes other than spasm and pressure from neoplastic formations, the essential pathology is ulceration of the mucosa and submucosa, followed by necrosis and exfoliation, the healing process being necessarily accompanied by cicatrization and contraction. Cicatricial stenosis may develop subsequent to ulceration from any cause, the pathology in many respects being not unlike that due to necrosis from the action of corrosives. The resulting cicatrix from even superficial ulceration may produce marked stenosis, but the extent of the contraction usually corresponds to the area of denudation, and the type depends upon the character and amount of the damage inflicted. Cicatricial stenosis from the accidental or intentional ingestion of corrosive fluids represents the most common type.

The term "malignant" when applied to stenosis in any anatomical situation is incorrect, and when referring to the esophagus the expression should be stenosis produced by malignant disease, i.e., the stenosis, *per se* can be neither malignant nor benign. Esophageal carcinoma may be either primary or secondary, the variety usually being epithelioma; sarcoma is almost unknown in this situation. Malignant disease of adjacent structures may involve the esophagus secondarily and produce stenosis. The pathology differs in no essential respect from that of malignant disease in other anatomical situations, and whether primary or secondary early stenosis may occur; the neoplasm may cause complete occlusion of the esophageal lumen with fatal termination.

The primary symptoms of esophageal stenosis are in some respects identical, regardless of the cause by which produced. There is noted gradually increasing dysphagia with regurgitation of

¹The term "cardiospasm" seems strangely incongruous when applied to the esophagus, since its literal interpretation is "spasm of the heart". The older designations esophagospasm and esophagismus appear more appropriate.

solid food, although in the earlier stages fluids apparently enter the stomach without difficulty. Pain may or may not be present over the stenosed area.

When due to corrosives the patient is usually observed before completion of cicatrization, and blood with shreds of exfoliated mucosa are commonly noted in the regurgitated material. The severity of the symptoms will depend somewhat upon the corrosive swallowed and the extent of the damage thus inflicted. In some instances the patient complains of intense burning pain beneath the sternum, there may be inordinate thirst, hemorrhage, and collapse. Portions of the eschar and bloody mucus have been regurgitated. In severe cases an immediate fatality may ensue from shock, hemorrhage, or perforation. In rare instances, however, the course may be prolonged, abscess formation, mediastinitis, pyopneumothorax, etc., occurring as complications or sequelae.

In stenosis from ulceration secondary to infectious disease, the symptoms are milder and less rapid in their progression. The patient may complain of difficulty in deglutition for weeks or months, and regurgitation of food for a time occurs only at intervals. The characteristic symptoms in all cases of esophageal stenosis due to infectious disease, and also in so-called spasmodic contraction, are dysphagia and the regurgitation of food.

Little need be said concerning the terminal symptomatology. In the event appropriate remedial measures be not instituted, the symptoms progressively increase in severity, all food is finally ejected because of inability to reach the stomach, the patient becomes rapidly emaciated, and death ensues from inanition, or perforation and collapse.

The diagnosis of esophageal stenosis from any cause presents no especial difficulty, but the exact type cannot always be determined upon consideration of the clinical signs alone. Where stenosis owes its origin to the ingestion of corrosives or foreign bodies, careful anamnestic and clinical investigation will usually develop the correct history. If the patient be observed early, inspection of the buccal cavity and fauces will reveal evidence of injury from the corrosive. Pain is an inconstant sign, and may therefore be misleading; intense thirst is sometimes noted. Nervous phenomena are usually prominent when stenosis is due to esophagospasm, and progressive dysphagia is present in every type. Dyspnea and dysphonia have been noted in stenosis due to pressure from aneurisms and neoplastic formations.

In stenosis from ulceration secondary to infectious disease, the clinical history is most important in connection with accuracy in diagnosis. In the

majority of instances esophageal stenosis following infectious disease does not develop until convalescence is well established. Where there can be obtained no history of previous systemic infection, the swallowing of corrosives or foreign bodies, malignant disease involving either the esophagus or adjacent structures may be suspected.

Absolute verification of the clinical diagnosis has been made possible by development and perfection of esophagoscopy, radiographic, and fluoroscopic technic. Notwithstanding that the history and information obtained by clinical inquiry may seem sufficient to establish the diagnosis, radiography should be practiced in every instance where there exists difficulty in deglutition, and it is of the utmost importance that this be done prior to esophagoscopy or the introduction of esophageal bougies, to determine the presence or absence of malignant disease or an aneurismal tumor as a complication or causative factor.

The usefulness of the esophagoscope in the diagnosis of esophageal lesions suggested to Janeway and Green its applicability in gastric diseases, and upon examining a "large number of patients" with both esophageal and gastric lesions they detected disease of the stomach in fourteen. They were able to recognize "cardial carcinoma" in the early stage, and remove sections for microscopic examination. They prefer that examination be made under local anesthesia.

According to Sippy, the symptomatology and diagnosis of esophageal stenosis are important, as grave mistakes have occurred, the difficulty being attributed to gastric disease, and in some cases gastro-enterostomy has been unnecessarily performed. If the symptoms suggest no contra-indication, a soft stomach tube should first be used to locate the site of obstruction. The presence of carcinoma should not be assumed without consideration of other causes of stenosis—extra-esophageal, such as aneurisms, tumors, spondylitis, pericardial effusion, diverticulum; or intra-esophageal, such as tumor, cicatrix, spasm, diverticulum, and foreign bodies. The diagnosis of carcinoma is indicated by the course of the lesion, the presence of blood in the feces, characteristic odor upon passage of the stomach tube, the location of the lesion (50 per cent. near the esophago-gastric orifice, 40 per cent. opposite the tracheal bifurcation, and only 10 per cent. in upper portion of esophagus), and finally the appearance as revealed by the esophagoscope. Diverticula occurring in the upper portion may cause tumor of the neck; in the lower section they may be detected by the introduction of bougies, the

nature of the contents, and by radiography after ingestion of bismuth. "Cardiospasm" is usually diagnosed by the fact that while the obstruction is impervious to food, even liquids, it yields to the pressure of a tube or bougie.

As Liebault wisely suggests, the older methods of investigation in these cases, *i.e.*, auscultation and catheterization, should be supplemented by radiography and esophagoscopy. However, radiography may lead to a mistaken diagnosis in esophageal stenosis unless the operator remembers that in normal subjects the bismuth may remain practically stationary for some time in the diaphragmatic region. This is explained by the physiological constriction which exists at that point.

Seelig describes a case in which differential diagnosis was uncertain, as between hysteria, esophageal stenosis, and diverticulum. Tests were made with bismuth emulsion, introduction of bougies, and finally by having the child swallow a fine gold chain two feet long. A subsequent radiograph showed the chain extending downward from the first cervical vertebra, terminating in a cavity to the left of the mid-line. External esophagotomy revealed marked stenosis in addition to the diverticulum.

The fact, says Lange, that organic and spasmodic esophageal stenosis may exist simultaneously, and that in neurotics, in valvular cardiac disease, and in mediastinal tumor, the introduction of stomach tubes and bougies may be distinctly dangerous, establishes the value of radiographic methods of examination. He suggests giving the patient first a small bismuth capsule, second a large bismuth capsule, third several swallows of bismuth mush; radiographic study during deglutition will immediately reveal any obstruction; the size and extent of the stenosis and whether organic or spasmodic can also be determined; deficient peristalsis will be shown by arrest of the bismuth capsule, thus rendering early diagnosis possible—before the stomach tube encounters resistance, and even before marked dysphagia is present. Increased mediastinal pressure may also be early recognized by arrest of the bismuth capsule in the esophageal lumen.

The absolute necessity of employing modern mechanical diagnostic aids cannot be too strongly emphasized, as they render possible the accurate determination as to location and character of the stenosis, and whether it be single or multiple. After filling the esophagus with bismuth mixture, provided the tube be not impervious, which rarely occurs, immediate radiography will reveal the site and also the extent and character of the lesion.

Direct visual inspection by the esophagoscope is

also distinctly advantageous, and esophageal bougies afford information as to location and caliber of the stenosis; but, for the reasons already noted, the use of these instruments should be preceded by radiography. It must also be remembered that multiple stenoses may not be revealed by either the esophagoscope or bougie, until the one situated most proximal has been dilated, because of the impossibility of introducing these instruments beyond the first constriction. Mosher wisely suggests, in this connection, that esophagoscopy is not without dangers, chief among which are (a) rupture of an aneurism, (b) perforation of the esophagus, and (c) sloughing of the esophageal walls from pressure of the instrument. The first danger should be easily avoided, as esophagoscopy should not be undertaken if an aneurism be suspected; rupture should never occur, because the instrument should not be advanced unless patulous esophageal lumen is visible in front; sloughing from pressure is most likely to occur when the esophageal lumen is narrow opposite the cricoid cartilage, and this may be avoided by using a smaller instrument. In employing the esophageal bougie for either diagnosis or dilatation, the fact must not be forgotten that its introduction may be attended by dangers, necropsy having shown that perforation of the ulcerated and friable esophageal walls has in several instances been thus produced.

The indications for treatment and the methods most appropriate will depend upon the location, extent and cause of the stenosis. In the early stages of so-called spasmodic contraction (esophago-spasm—"cardiospasm"), no local treatment may be required, as in certain cases the symptoms disappear following systemic medication directed toward restoration of normal physical and nervous equilibrium. However, where nervous phenomena are accompanied by actual anatomical constriction of the esophageal lumen, dilatation or some other suitable plan of treatment must be employed. The methods of examination already outlined will usually be sufficient to determine whether or not stenosis actually exists at any point within the esophageal lumen. In numerous instances of so-called spasmodic contraction recorded in the literature of the last few years—in some of which there was claimed to be a "valvular" constriction at the esophago-gastric orifice—dysphagia subsided following systemic treatment, supplemented by introduction of bougies for the psychic effect.²

²There normally exists no anatomical valve at the esophago-gastric orifice, nor is there any distinct sphincteric action of the esophageal musculature in this situation. There is, however, a sphincter-like action at the hiatus esophagi due to arrangement of the diaphragmatic musculature which encircles the aperture. These anatomical facts have been accorded insufficient attention by previous writers.

The literature contains the records of several hundred cases of so-called cardiospasm, the majority of them reported since adoption of this term a few years ago. Plummer mentions nearly one hundred and fifty personally observed instances, in ninety-one of which there was diffuse dilatation of the esophagus without anatomic stenosis—"cardiospasm." In the majority of cases a cure is said to have been effected by dilating the esophago-gastric orifice by hydrostatic pressure according to the method usually accredited to Plummer (1908), but originally suggested by Russell (1898), further elaborated by Pyle in 1900, and later by Schroeder.

Meyer records a case of "impermeable cardiospasm" treated by thoractomy and esophago-plication. After preliminary gastrostomy attempts at dilatation through this opening were unsuccessful. Under positive differential pressure the lung was exposed and pushed away from the mediastinum, diaphragm, and aorta. A large sac was found above the esophago-gastric orifice. The overlying pleura was divided, the pneumogastric nerves separated from the esophagus, and double esophago-plication performed, care being taken not to penetrate the esophageal wall nor to include the pneumogastric nerves. The esophagus was replaced and the wound closed. The patient was able to swallow solid food in a month, and progressively improved until all symptoms subsided.

Where stenosis is due to malignant disease, involving either the esophagus or adjacent structures, marked prolongation of life cannot be definitely promised from any method of treatment. Mediastinal carcinoma is one of the most rapidly fatal lesions afflicting the human being. Where malignant disease is primary and confined to the esophagus, partial esophagectomy may sometimes be justifiable, but the results following the operation have not thus far been very encouraging. Where a portion of the esophagus is surgically extirpated, a series of plastic operations may become necessary for restoration of its lumen, and the patient usually succumbs from extension of the disease before the desired anatomical result has been attained. It is doubtful whether esophagectomy should ever be undertaken for attempted cure of stenosis due to carcinoma, unless the disease is strictly confined to the esophagus and the diagnosis can be perfected in the earliest stage, and even then the life of the patient may not be materially prolonged by the operation. Preliminary gastrostomy is always required to afford a means of nourishing the patient while the esophagus is temporarily out of commission. Dilatation of an esophageal stenosis due to malignant disease is absolutely contra-indicated, because of

the danger of rupturing the weakened and friable esophageal walls, and thus hastening a fatal termination.

In contradistinction to the foregoing, some wonderful results have been reported from partial esophagectomy for carcinoma. Lane restored the continuity of the upper esophagus with a tube constructed from a strip of skin from the neck, retaining an attachment for blood supply, which was severed after union. The patient was fed through a tube until union was secure. Subsequent necropsy revealed recurrence of the carcinoma in the left side of the neck. The implanted skin-tube did not differ in appearance from the normal esophagus. The operation demonstrated the feasibility of substituting skin to repair the defect, provided the portion removed be not in too close proximity to the larynx (Lane).

Torek records what he claims was the first successful resection of the thoracic portion of the esophagus for carcinoma (March 14, 1913), gastrostomy having been performed previously. Anesthesia by tracheal insufflation according to the Meltzer-Auer method; incision through whole length of seventh intercostal space from posterior end of which incision extended upward through angles of seventh, sixth, fifth and fourth ribs; pneumogastric nerves carefully separated by dissection. Pulse never wavered, no vagus collapse. Difficulty in dissecting that portion of the esophagus which passes behind aortic arch overcome by ligating thoracic branches of aorta and lifting it forward; to avoid leakage from upper esophageal stump, esophagus eliminated from pleural cavity altogether by dissecting from attachments upward to neck and bringing it through incision at anterior border of left sterno-cleido-mastoid muscle. Thorax closed without drainage; patient made good recovery. "In the light of the success which attended this new method of attacking the disease, it becomes our evident duty to advise operation at once, and thus we shall have the satisfaction of saving the lives of many who otherwise would have been doomed to succumb to their affliction" (Torek).³

Lexer used skin flaps in reconstructing the cervical portion of the esophagus and intestine for the remainder, and cites two cases in which healing promptly occurred, deglutition thereafter being perfect. He next endeavored to form the entire esophagus from skin flaps dissected free and rolled into a tube the size of a finger; the skin of the chest was undermined so it could be united over the tube

³A similar operation was performed by Zaaier January 9, 1913, or two months prior to the one reported by Torek. In Zaaier's case the carcinoma involved the lower portion of the esophagus. The patient recovered. This is the first resection of the esophagus for carcinoma, and Torek's is the second (Meyer).

which was sutured to the stomach a month later. Perfect anastomosis resulted, but unfortunately, the carcinoma recurred before esophago-pharyngeal anastomosis could be effected. In another instance a loop of jejunum was used to replace the esophagus with successful result.

Meyer reviews the following operative procedures for esophageal carcinoma: (1) esophagoplasty by means of skin-plasty (Bircher, 1894), (2) inferior esophagoplasty with the help of a totally excluded coil of jejunum (Wullstein, 1904-1908, Roux, 1902), (3) inferior esophagoplasty with the help of the totally excluded transverse colon (Kelling, 1913, Vulliet, 1911), (4) inferior esophagoplasty with the help of a dissected portion of the major curvature of the stomach (Jianu, 1912). He believes the Jianu operation has to some extent revolutionized esophageal surgery for malignant disease, and where diagnosis can be perfected and operation performed early, surgeons are justified in advising radical intervention. He advocates the Jianu procedure and reports one successful operation. A portion of the major curvature of the stomach is dissected and formed into a tube, the lower end remaining connected, the upper end being free, which is used for reconstructing the esophagus. If carcinoma be located above, behind, or just below the aortic arch, the tube is drawn upward extra-thoracically below the skin or pectoral muscle to a point near the mammary gland (Jianu), and at the second seance (after resection) the oral end of the esophagus having also been transposed extra-thoracically (v. Mikulicz, Kelling, Ach.), the connection between the mouth and stomach can be completely restored, either directly by end-to-end suture, or by a subsequent plastic operation—extra-thoracic esophagoplasty. Where carcinoma is located in lower third of esophagus, the tube is transposed intra-thoracically through the esophageal foramen "alongside the cardia" and connected with the undisturbed oral end of the esophagus by end-to-end suture—intra-thoracic esophagoplasty (Meyer).

In cicatricial stenosis from ingestion of corrosives or foreign bodies, also ulceration secondary to infectious disease, the treatment *par excellence* is progressive dilatation, either with or without preliminary gastrostomy as may be required by the conditions present. Divers and sundry methods of accomplishing dilatation have from time to time been devised and practiced, all of which doubtless have their indications, contra-indications, and limitations. The oldest and most common practice is dilatation by frequent introduction of olive-pointed

bougies, the size being gradually increased until the normal esophageal caliber has been restored.

Prior to present perfection in the technic of esophagoscopy and radiographic diagnosis, the treatment of esophageal stenosis was most unsatisfactory, verification as to the extent and character of the lesion being impossible. While these modern mechanical methods of diagnostic precision have suggested remedial measures which can be instituted under actual visual inspection and with the assurance of accuracy in their technical application, dilatation remains the method of choice, although in the treatment of cicatricial stenosis division by the esophagotome has been advocated and successfully practiced by various surgeons. After dividing the stenosed area with the esophagotome dilatation is required to maintain patency of the esophageal lumen. The "string-cutting" method of Abbe is too familiar to require description. It may be advantageously employed under certain circumstances.

Since the most appropriate and least dangerous plan of treatment is progressive dilatation, the question naturally arises, what method shall be employed? The use of graduated bougies has already been mentioned. As an improvement upon older methods of accomplishing dilatation, Russell (1898) devised what he called a "silk-covered rubber balloon," to be distended by internal pressure after introduction into the esophagus, and reported a series of cases successfully treated by his method. These were probably "cardiospasm," as the author mentions "dilating the cardia" by means of his apparatus.

Two years later Pyle (1900) described a somewhat similar method, his device consisting of a tube composed of rubber and silk the size of a No. 12 (male) catheter, a piano wire guide bearing an olive point, two tissue-rubber digital-shaped sacs, one very fine digital-shaped silk sac, and a force-pump, "including the necessary trimmings." The wire guide is placed in the rubber tubing and the proximal end secured by metal used for connecting the tube to the force-pump. The delicate rubber and silk sacs are fastened to the rubber tube by strong linen thread. The olive-pointed guide is used to carry the sac through the stenosed area. When once engaged warm water is forced into the sac by means of the pump. Above and below the stenosis the sac expands to the limit of the silk covering, the stenosis causing it to assume an hour-glass shape. If additional water be forced into the dilator, the entire pressure is exerted upon the contracted portion, compelling the stenosed area to yield to the internal pressure. Graduated sizes may be used. Pyle reports a case of esophageal stenosis

following typhoid fever successfully treated by his method.

The instrument and method of procedure suggested by Schroeder (May, 1908) is interesting in this connection: Having located the site of the obstruction with the olive-tipped bougie, a stomach-tube of proper size is passed to the obstruction. The tube has an opening only at its lower end and no lateral fenestrae. At its middle is inserted a bulb. The tube is now filled with water, raised, and its upper end compressed with the fingers. Firm, even, continued pressure is now made on the bulb by the operator. A column of water is thus pressed against the obstructing tissue. If the obstruction is purely spasmodic, it will suddenly relax and the water is felt to pass from the tube, which follows instantly and easily. If the obstruction is organic and incomplete, the water will gradually pass, by this method, through the obstructed portion, but the tube does not follow. A similar result will follow if the obstruction is partial from organic cause, but is made complete by a spasm. The safety of this procedure lies in that before the esophagus can be injured or ruptured in the presence of an unyielding obstruction, the water will return along the side of the tube. In compression from an unsuspected aneurism the danger of perforation will also be lessened (Schroeder).

A few months afterward Plummer (August, 1908) further elaborated the method of dilatation by hydrostatic pressure, and devised the instrument known as the "Plummer dilator." The instrument consists of one rubber tube leading from a water tap to the indicator arranged like a steam gauge, which registers the pressure of the column of water; the second tube leads from the dilator to a "T"; the third tube leads from this "T" and is used to press upon with the fingers as water passes to the indicator and to regulate pressure in the dilator; the fourth tube leading also from this "T" is attached to the dilator, which consists of a flexible staff passed through a hollow tube of rubber. At the lower end of this tube a number of holes are made, and at the end of the flexible staff there are threads for attaching graduated olive tips as required. Over the lower end of this tube containing the holes is a small rubber bag four or five inches long; covering this rubber bag is a silk bag, and over this another thinner rubber bag. The object of the silk bag is to insure uniform pressure from the water. When turned into the tube the water distends the bag, and if not secured by silk it would dilate upon each side without actually dilating the stenosed area. When distended the bag resembles a sausage, being about an inch in diameter and five

to six inches long. While according to my understanding the Plummer instrument was devised expressly for the treatment of "cardiospasm," i.e., for dilating the esophago-gastric orifice, there seems no good reason why it might not be satisfactorily employed in selected cases of uncomplicated stenosis involving other portions of the esophagus, provided requisite care be exercised in its application. However, in extensive or complicated organic stenosis with marked tortuosity of the esophageal lumen, it is doubtful whether the Plummer dilator could be successfully employed, and in stenosis due to malignant disease its use would certainly be contra-indicated.

According to Plummer and other writers, the adaptation of Mixer's method of using a silk thread as a guide has proved of inestimable value in the treatment of esophageal stricture by dilatation. The patient swallows six yards of silk thread; this passes down through a sufficient number of coils of intestine to prevent its withdrawal on being pulled taut. "With the whalebone staff and olive passed on a silk thread we may locate pockets, determine their depth, measure the diameter of strictures, divulse them, and estimate the rigidity of the esophageal wall at the site of narrowing." Only sufficient force to detect obstruction is permissible in advancing an unguided esophageal sound. With a silk thread that degree of force may be used which is short of carrying the thread out of its course and through the esophageal wall, or of endangering the esophagus by longitudinal traction, or of splitting the esophagus by a dilating wedge. If sufficient obstruction is encountered to make it seem possible that the thread might be carried out of its course, a piano wire should be first passed on the thread and the olive passed on the wire. With the wire in place the possibility of introducing a sound is assured. When passing an olive on the wire, tension on the thread should be maintained to avoid any possibility of the tip of the wire penetrating the wall of the stomach or esophagus. Various sizes of piano wire may be used and its flexibility further varied by the amount of wire exposed (Plummer). It is claimed that by the early utilization of this procedure, dilatation can be accomplished from above, the necessity of preliminary gastrostomy being thus avoided.

Where esophageal stenosis cannot be dilated from above or below, Rikitzky recommends a plastic operation, and reports a case in which the esophagus was exposed, opened above and below the stenosis, and the cicatrix excised, the resulting defect being repaired with an inverted skin flap. A tube previously introduced into the esophagus was retained

in situ by strings through the nose and gastric fistula. The flap was subsequently divided from its pedicle, the wound healed, and the gastric fistula was allowed to close. "The patient was able to swallow all kinds of food, and was perfectly well when discharged. The rapid repair of the esophageal wound may be attributed to the preliminary gastrostomy; this operation would seem to be indicated as a preliminary measure in all operations in which portions of the esophagus are to be excised."

In two cases where stenosis occurred near the esophago-gastric orifice, Maffei adopted more radical measures. The esophagus was exposed by thoracotomy and numerous adhesions to the pleura were found. After these were freed a sound could be passed into the stomach. Convalescence in the first case was complicated by an empyema; in the second the wound had healed by the twelfth day; both patients were fed by the mouth after operation, and the gastric fistulae closed spontaneously.

Where stenosis involves the entire circumference of the esophagus, Jackson recommends the string-cutting method of Abbe modified for use with the esophagoscope, so that the surgeon can work from above and thus obviate the necessity of a gastrostomy. The operation is performed by a "string-cutting esophagotome," supplemented by a "dilating esophagotome." He claims this method is useful when the opening can be found, but in the majority of long-standing cases a dilatation or diverticulum exists above the stenosis, and it is frequently impossible to locate the opening. In such cases, however, the esophagoscope serves as a speculum, and obviates the danger of operating blindly.

On the contrary, Eastman believes that in benign stenosis of the esophagus, gastrostomy is advisable not only to provide a means of maintaining nutrition while the lesion is undergoing treatment, but also as an avenue for retrograde dilatation, for the practice of Abbe's string-saw, or Ochsner's double catheter methods. So long as semi-solid or even a portion of solid food can be swallowed, dilatation or tubage should be practiced; but when the patient can only swallow liquids, Eastman thinks "we are slavishly following the teachings of pre-aseptic days if we do not resort at once to gastrostomy, not only because of its indirect usefulness, but also because of its curative value *per se*."

In discussing Rosenheim's report of a successful dilatation of diphtheritic stenosis of the esophagus, Ewald referred to a peculiar observation of his in dealing with benign stenoses, viz., that the cicatricial type, for which gastrostomy had been performed, nearly always improved after the gastric opening had been provided for the introduction of food, the

stenosis gradually developing a larger caliber without other treatment. Dunn also advocates gastrostomy in all cicatricial stenoses, and reports three severe cases, one following typhoid ulceration, and two from the ingestion of concentrated lye. Repeated attempts had failed to reach the stomach through the mouth. Complete cure followed gastrostomy with retrograde dilatation with a modification of Dunham's wire and spindle bougies.

By dilating or cutting, Guisez was able to cure twenty-three out of twenty-eight serious cases of impassable esophageal stenosis. The results were better the more recent the development of stenosis, and the short, valve-like lesions responded most readily; multiplicity of the stenoses was no obstacle to final success, each being treated in turn. Long lesions with longitudinal infiltration were the most difficult to cure as the contraction displayed a great tendency to recur. He prefers to use the esophagoscope in passage of the sound. The instrument is left in place a few hours, and the size gradually increased until the stenosed area is fully dilated. This measure was effective in forty-four out of fifty-four cases; in the remaining ten it was necessary to resort to gastrostomy.

In stenosis of the cervical portion of the esophagus, Lerche advises dilatation with or without division. After full dilatation is accomplished the largest bougie is introduced at intervals and left in situ for ten minutes in children and fifteen to thirty minutes in adults. If the stenosis is resistant the esophagoscope will determine its length and position; the knife is then introduced and the necessary number of incisions made. In children, 1 to 1.5 mm. blades, and in adults, 2 to 3 mm. blades should be used. Multiple lesions can be successfully treated by the esophagotome, and he emphasizes the fact that the cutting of the stenosed area must be done under guidance of the eye, i.e., through the esophagoscope. He does not consider gastrostomy justifiable, either for purpose of feeding or for retrograde dilatation, until his method of treatment has been tried.

In several instances of cicatricial stenosis observed by Gross and Sencert, progressive dilatation proved successful under direct visual control by means of the esophagoscope. In two others stenosis was finally cured by introducing laminaria tents progressively increasing their size. In two others linear electrolysis relieved impermeable stenosis. In one case dilatation was attempted without endoscopy and fatal perforation resulted. Where direct intervention appears dangerous, gastrostomy with retrograde dilatation is advised.

According to Fischer, the esophageal lumen may

finally become impassable even to a string, and in a case of this description he resorted to a rather formidable procedure, viz., "transthoracic cardiomy," the patient dying twenty-four hours thereafter from pulmonary congestion. He does not hesitate to recommend the operation as appropriate where otherwise the patient would be subjected to life-long feeding through a gastric fistula. The operation was performed upon a boy of three years under Meltzer-Auer continuous insufflation for an impassable stenosis beginning at the tracheal bifurcation and ending 1.5 cm. above the diaphragm. After pushing the well-distended lung away from the diaphragm through incisions in the seventh and eighth intercostal spaces, the esophagus was exposed and dissected free; traction was then made by a loop of gauze and forceps pushed through the layer of diaphragmatic pleura and peritoneum, and the peritoneal cavity opened; the stomach was carefully pulled into the thoracic cavity until a point was reached about 7 cm. below the esophago-gastric orifice; the pleural cavity was "packed off" with silk handkerchiefs; the stomach was incised 3 cm. below the esophageal opening and a urethral catheter passed through the stenosed area and outward through the mouth; long dressing forceps now inserted into gastrostomy opening (made at a previous operation), and lower end of catheter pulled through the gastric fistula; gastric incision sutured; esophagus fastened to diaphragmatic ring, and thoracic wounds closed.

My personal experience with esophageal stenosis is limited to two cases, each of which followed a prolonged attack of typhoid fever.

The first patient was a male of 17 brought to me by Dr. George R. Simpson, of Breeding, Kentucky, November 7, 1906. He had just recovered from an attack of typhoid fever of three months' duration. The first evidence of stenosis was discovered in the tenth week of the fever, and difficulty in swallowing had gradually but steadily increased for four weeks, when he was brought to Louisville for treatment.

When I saw the patient he was greatly emaciated and feeble. He could swallow only liquids in small quantity and very slowly. I succeeded at first in passing a No. 21 soft bougie. The constriction was near the esophago-gastric orifice. By gradual dilatation I was enabled, at the end of two weeks, to pass a No. 41. This size was used every other day for two weeks, when the patient having been taught to use it himself, was permitted to return home with instructions to continue the treatment for at least two months. Soon after beginning use of the No. 41 bougie, the patient was able to swallow well-masticated solid food, and his general improvement was rapid. In a letter dated February 1, 1915, Dr. H. B. Simpson, son of the physician who brought

the patient to me, states that the man is now a strong, healthy farmer, and has no trouble whatever with his esophagus.

In his letter Dr. Simpson mentions a case of esophageal stenosis in a child of four years following diphtheria, which occurred in his practice last year. This lesion was also near the lower end of the esophagus. He treated it by gradual dilatation, which he had seen practiced in my first case. It was necessary, however, in this instance to anesthetize the patient. The child made a complete recovery.

In January, 1907, the second patient came to me from Eastern Kentucky. A man 30 years of age had been ill with typhoid fever for three months, and noticed difficulty in swallowing when he first began taking solid food several days after subsidence of the fever. The difficulty steadily increased and when I saw him about four months after the first evidence of stenosis was noted, he could scarcely swallow liquids, and his physician had been trying to nourish him by enemata. He was decidedly the most emaciated person I had ever seen.

Failing to pass even the smallest bougie, I advised gastrostomy with the view of dilating the stenosis from below and also for the purpose of nourishing the patient. This was declined, and the patient returned to his home. I never heard from him after he left the hospital.

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TONSILLECTOMY: THE FORWARD INCLINED SITTING POSTURE UNDER N₂O-O₂ ANESTHESIA AND OTHER NEW FEATURES.

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Through recent investigation the tonsil, as a source of systemic infection, has become even more prominent than heretofore. The character of these infections and the permanent damage done by them to the heart and many other structures demand a most perfect operation to prevent a continuation of the infective process through this avenue.

The question of the effect of tonsil operations upon the voice, both speaking and singing, is one which is constantly met and which merits more consideration than we can give it here. No less an authority than Lennox Brown says that as a rule "nothing but ultimate good to the voice can follow from this operation in suitable cases." Semon and Watson Williams declare that "removal of tonsils never impair the voice." On the other hand, Lack believes that there is a risk to the voice, especially in adults. Bethl warns against the removal of singers' tonsils, and D. Hudson Makuen advises splitting the tonsil horizontally, leaving the lower lobe to act as a separator of the anterior and posterior pillars, thus preserving a freer muscular action in voice production.

Our own experience is that the voice in two classes of patients is *benefited* by a clean tonsillectomy: first, those with enormously large tonsils which elevate the soft palate toward the posterior-pharyngeal wall, thus narrowing the naso-pharyngeal opening and thereby diminishing the nasal resonance; and second, those with small tonsils which are adherent to the muscles from old peri-tonsillar or other inflammations. Improvement in voice varies from an increased resonance and quality, with greater ease and more endurance, to an actual increase of one or two notes in the upper tone register in singers.

Voices have been impaired by tonsil operations, but it is doubtful that the sacrifice of the tonsil itself should be held responsible. It follows rather, a tonsillotomY in which a portion of the tonsil is left, and contractions or adhesions between the remnant and the faucial pillars limit the action of the muscles. Voices are very materially injured or ruined by unnecessary laceration of the pharyngeal and

palateal muscles. In these cases the *operation* receives the blame, when a poor technic or none at all is probably responsible.

In the early years of child life the tonsils are subjected to a vast amount of infective material in the form of ordinary dirt as well as those diseases having tonsillary manifestations, such as scarlatina, measles, diphtheria, influenza, etc.

If the tonsil through the early months and years protects the child without itself becoming diseased, it should not be removed. But if it becomes damaged and thereby not only fails to protect but becomes a source of infection, which at any time may find its way into the blood stream, causing heart disease from which the patient may never completely recover, or rheumatism with its unhappy consequences, tuberculosis, etc., there is one proper treatment—*complete* removal in the capsule. Occasionally tonsils are so large that excision is warranted without other definite pathology.

Contrary to the general impression, the large protruding tonsil is more nearly normal than most tonsils which are submerged and difficult to see. The large projecting tonsil usually drains well, since its crypts open freely into the pharynx. But the submerged tonsil drains poorly because its crypts are covered by plica-tonsillaris, or adhesions where decomposition and inflammation are sure to take place and become a possible focus of infection.

The examination: A careful examination of the crypts will reveal whether or not the tonsil is diseased. This necessitates an inspection of the tonsil from all sides. A submerged tonsil is often difficult or impossible to examine, unless lifted out of its concealment. If the tonsils are wholly or partially degenerated and contain cavities or broken down follicles, giving evidence of inflammation and poor drainage, tonsillectomy is indicated. To accomplish this in the safest, surest, most thorough and rapid manner, with a minimum of after-effects, and with the shortest period of convalescence, should be our highest aim.

In looking up the technic in our latest text-books we find Ballenger lauding the Sluder guillotine in one sentence and in another describing it as unsuitable for the submerged or firmly adherent tonsils following quincy, for severe anginas, and, in thin tonsils, or tonsil stumps. These tonsils need a thorough operation most.

The great advantages of the simple snare are the ease and certainty with which the flexible wire loop sweeps through the sinus tonsillaris following the capsule, when properly applied, and the protection of the surrounding structures from injury.

The greatest danger in tonsil operations as ordinarily performed are: first, the anesthetic; and second, hemorrhage. It is doubtful if the anesthetic should be given first place as a danger factor. The recumbent position which has been and is still the position most commonly employed, subjects the patient in a tonsil operation to the danger of drowning or suffocation from the hemorrhage, which in some cases has been attributed to the anesthetic. When local anesthesia is used, secondary hemorrhage is to be dreaded.

We are firmly convinced that the facts as given above constitutes the *bête noir* of throat work and that the only solution of the whole problem is a technic which includes the forward inclined sitting posture with general anesthesia for both child and adult. This position is admittedly the one of choice since, among other reasons, the structures are in their normal positions as examined previous to operation, and it is the only position in which blood may be kept from entering the trachea. Many operators prefer local anesthesia in adults, with its many disagreeable features, both for the operator and the patient, solely because of the erect posture. These same surgeons must, however, use a general anesthetic for their little patients.

The general anesthetic most commonly used is ether, which for this work has but little to recommend it. It is the most disagreeable anesthetic known from the standpoint of the patient; its odor and slow induction stimulates the child's tendency to cry and struggle; the memory of these two or three minutes are like a nightmare and childhood is gone before it is forgotten. Then, after the operation is over, the usual post-operative ether vomiting (often attributed to the swallowing of blood) not only renders the patient uncomfortable, but becomes an active factor in exciting post-operative hemorrhage.

From the standpoint of the surgeon, ether, when administered by the open drop method, interrupts the operation and fosters a tendency to overdose the patient in an effort to lengthen the operative periods. It stimulates the flow of mucus in a large percentage of cases which, together with the blood, may be churned into a froth when the patient is in the recumbent posture or any of its usual modifications. This froth when inspired into the smaller branches of the bronchial tree is quite impossible to dislodge; then, only heroic measures with an abundant supply of oxygen will save the patient from asphyxiation.

We have selected nitrous oxid-oxygen as our general anesthetic, because it is especially adapted to

intra-oral work in the sitting posture. Over a most extended use in dental practice, which is nearly identical in its requirements with tonsil operations, it has proven itself beyond any doubt to be the *safest* anesthetic.

When compared with ether it induces anesthesia without odor or excitement so quickly that the patient is under before they realize it; there is no interruption of the operation, since it is administered through the nasal inhaler under sufficient pressure to supply the respirations without any air entering through the open mouth; there is never a noticeable amount of mucus secreted; post-operative vomiting is very rare and *never* protracted; the patient regains complete consciousness within five minutes and is able to co-operate with the nurse; water may be taken at once *ad libitum*, since ether is never needed or used with the technic to be described.

While the technic of administering the two gases is not difficult to attain, nevertheless, a thorough knowledge of the signs of this anesthesia and some instructions by an expert in it is quite important in obtaining good results at once. The cost of the gases depends upon the size tanks in which it is bought, but we use about \$1.00 worth to a case.

Technic: Added to the usual preparation of the patient for operation in children of robust build, or excitable nature, we administer an hour before operation $1/10$ to $1/8$ of a grain of morphine with hyoscin $1/300$ to $1/200$ of a grain. For adults, the dose may be increased to the full tablet containing morphine $1/4$ of a grain, hyoscin $1/100$. Children under ten receive no hypnotic. Our object in using the hypnotic is to secure a more tranquil, care-free state of mind in the patient just before the time of operation, to widen the margin of anesthesia, and to relieve pain immediately following the operation and recovery of consciousness.

The patient is placed in an especially designed chair, which is adjustable for all sizes of patients, having no arm or foot rest. The seat of the chair is brought $2\frac{1}{2}$ to 3 feet from the floor, the back of the chair is then brought *forward beyond* the vertical meridian, and the head rest still further forward so that the oral axis is pointed downward toward the floor at an angle of 120 degrees, or about the reading posture. The patient's body is, therefore, inclined forward, the chin down near the chest and the feet clear of the floor. The patient's position is thus maintained by a series of straps passing about the ankles, the pelvis, and the shoulders. These straps are always adjusted before beginning anesthesia. It is of extreme importance to retain

the shoulders against the back of the chair so that the head rest may accomplish the very important work of declining the chin; this we accomplish by a figure-of-eight strap passing under the arms, over the shoulders, and crossing back of the chair, thus maintaining firm pressure. This position aids respiration by holding the shoulders back.

The operator lowers his stool to the point where his visual line corresponds to the axis of the oral cavity, so that when he looks into the patient's throat his line of vision is directed well upward. Any blood will now run forward out of the mouth even from the adenoid area.

The Klar headlight with the Tungsten lamp and battery in pocket is employed so that the light is



Fig. 1. Showing position of the patient, nasal inhaler in position, the second step in the operation.

constant and no cords to interfere. Sufficient daylight is admitted on the patient's left or right to permit the anesthetist to note the changes in color as an aid in determining depth of anesthesia.

The usual sterile sheets and towels cover the patient.

The nasal inhaler is now applied with elastic bands about the head to hold it in position; the breathing tube leading to the gas-oxygen apparatus behind the chair is connected to the inhaler, and the patient is instructed to keep the mouth closed while the gases are inhaled. Anesthesia is obtained by administering pure nitrous oxid during the first twelve breaths, but *before* consciousness is quite lost, about the eighth breath, the patient is commanded to open his mouth, when a Whitehead gag is inserted, and the mouth covered with eight or ten layers of gauze to prevent the inhalation of air while the anesthesia is carried to its required depth.

After the first twelve breaths, sufficient oxygen is now mixed with the nitrous oxid to prevent deep

cyanosis, twitching, dilated pupils, etc., the signs of anoxemia. When the patient is fully anesthetized, which is evident from the character of the respiration, sluggish pupillary reflex, absence of winking when stroking the lashes or touching the conjunctiva with a *clean* finger (all usually associated with a rose color of the skin), the pressure in the gas bags is increased by tightening the pressure screw on the apparatus. The gauze is now removed from over the mouth, and the exhaling valve on the nasal inhaler screwed down so that the gases enter so rap-

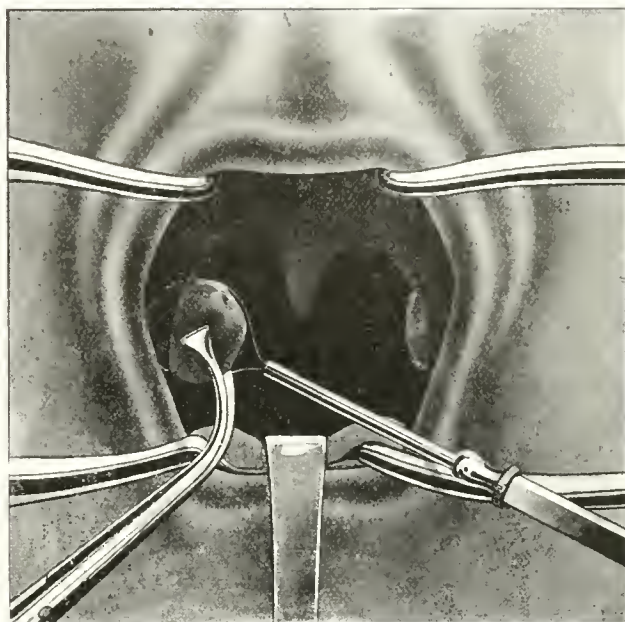


Fig. 2. Applying snare (reverse of the usual method), showing the sweep of the wire loop around the tonsil, utilizing the spring of the No. 7 wire in keeping the loop hugging the capsule.

idly through the nose and through the mouth-hook, now placed in the corner of the mouth, that inhalation of air through the open mouth is impossible. Through the remaining period of anesthesia this constant flow of gases is maintained, varying the mixture of oxygen and nitrous oxid according to the signs exhibited by the patient. Up to this moment we have occupied from one to two minutes when the operation may proceed.

The following method of attack is not varied and is methodically carried out in each case, whether the tonsils are free or submerged, large or small, firm or necrotic:

The tongue is depressed with the tongue depressor in the left hand and a tenaculum is applied to the right tonsil and locked. Still holding the tenaculum in the right hand, the assistant exchanges the dull curved dissector for the tongue depressor in the left hand; with this the mucous membrane between the anterior pillar and the tonsil is broken vertically

far enough to admit the tip of the right index finger. The operator now takes the tenaculum in his left hand and elevating the wrist reaches the right hand under the left wrist, inserts the *right* index finger into the opening made by the dissector, pushes the finger into, and sweeps the tonsil fossa, completely separating the capsule from the pharyngeal muscle upon which it lies. The snare of the Brown type with a No. 7 piano wire only (no guard over it) is passed over the handle of the tenaculum with the end of the wire loop to the patient's *right*, the snare handle itself being to the *median* line of the tenaculum. The wire loop slips into the *anterior* tonsil fossa, the tip of the snare tube is crowded into the *posterior* fossa, when the snare is tightened down on the pedicle, *but not severing it*. The adjusting nut is now screwed down to prevent the wire loop from opening. Both the snare and the tenaculum are now dropped into the corner of the patient's mouth and allowed to remain there until the other tonsil is prepared in precisely the same way, only by a complete reversal from right to left in the entire technic from the time the tongue depressor is applied by the right hand instead of the left, until the dissection is finished with the left index finger and the snare applied over the tenaculum with the loop to the patient's *left* side.

The assistant now takes the tenacula, and the operator both snares, one in each hand, and simultaneously removes both tonsils. If there are adenoids they are at once removed in the usual manner. The operation is completed, the whole time required not exceeding six minutes, including the induction period of anesthesia.

We invite particular attention to the mode of application of the snare, as it is backwards to the usual method, but much to be preferred because the spring action of the wire *makes* it sweep through the fossa and *follow* the capsule, and the muzzle may be crowded *behind* the tonsil because it is not flexible like the wire. The older method often leaves a portion of the tonsillar tissue to bleed or cause further trouble, because the wire loop in the posterior fossa is uncontrollable and does not follow the capsule in many cases.

Up to the instant when both tonsil pedicles are severed practically no hemorrhage has occurred, but at this moment a slight gush of blood is seen, which by reason of the patient's position flows outward and downward over the tongue and out of the mouth. After examining the tonsil beds the nitrous oxid is stopped, while the oxygen is allowed to flow slowly until consciousness is regained, usually requiring from one to two minutes.

The patient is now placed in bed on his side with the face over the edge of two pillows and pointed slightly downward so that the saliva or blood is readily expectorated and not swallowed.

No one factor is greater in the accomplishment of a clean tonsillectomy than the finger dissection. The finger is preferred to any instrument as a dissector or separator of adhesions. This *modified* finger dissection, however, is productive of still less trauma and consequent soreness than where the finger is used alone, since the trauma to the anterior pillar resulting from the excessive pressure required to rupture the mucous membrane connecting the

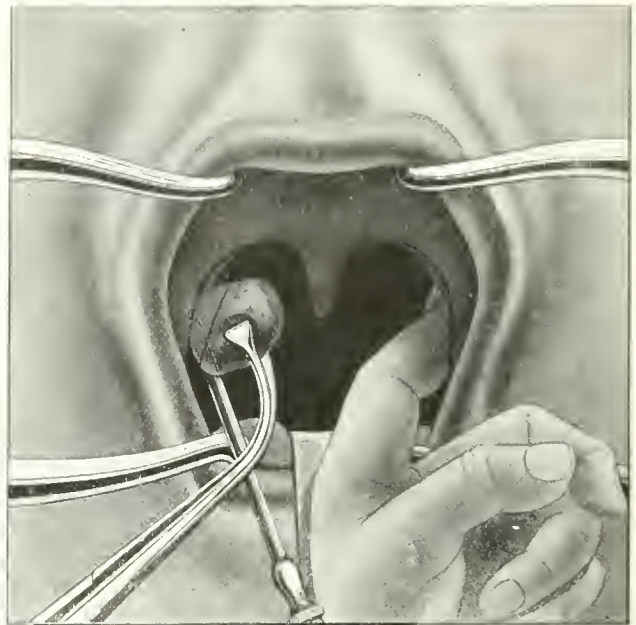


Fig. 3. Snare wire tightened down on pedicle of right tonsil, to be removed after the left is also snared. Finger dissection begun on left, the nail is not used in dissection.

tonsil and anterior pillar is avoided by the use of the blunt curved dissector as described, preliminary to the introduction of the finger-tip.

Hemorrhage, after leaving the operating table, has occurred but once in the past three years in which this technic has been used exclusively, and that was in an arterio-sclerotic woman of 55, whose tonsils were removed because of rheumatism. One child bled in the operating room three to four minutes from the adenoid area. This extremely low record of hemorrhage is attributed to the anesthetic; to the absence of nausea and vomiting; to the erect posture, and more than all, to the total absence of all edged or pointed instruments in the operation. The vessels which enter the tonsils are crushed by the snare and hemostasis thus induced. The vessels of the pillars and pharyngeal muscles upon which the tonsils rest are uninjured, and it is

these vessels which bleed when severed by cutting instruments. For the same reason, our patients eat with little discomfort within 24 hours, because the pharyngeal muscles which begin the action of swallowing are uninjured. In this technic the perimysium is scarcely broken, since in the finger dissection the *ball* of the finger-tip is kept against the throat wall and the nail against the tonsil. Convalescence is further shortened by the elimination of the gauze sponge and its trauma, so that the average patient is entirely well on the third or fourth day, and at no time particularly uncomfortable.

Our technic, comprising the following features, is original:

1. Forward inclined sitting posture with chin near chest.
2. Continuous nitrous oxid-oxygen anesthesia *without ether*.
3. Backward application of the snares.
4. Application of a snare to each tonsil, when both are removed simultaneously.

CONCLUSIONS.

1. This technic is uninfluenced by the size of the tonsil and is equally adapted to the free, the submerged or adherent types.
2. It is applicable to patients of all ages.
3. There is a marked reduction in both the operative and post-operative hemorrhage.
4. The forward inclined sitting posture is natural, convenient, and the safest position for this operation.
5. In this position, blood takes care of itself by gravity, aided by the flow of gases out of the mouth, in a more effectual manner than is possible by sponging, suction apparatus, or any other position in which the operation may be thoroughly done. The danger of asphyxia by inspired blood or froth is absolutely eliminated.
6. Nitrous oxid-oxygen is an ideal anesthetic for this work in this position: the use of ether is never necessary and has not been employed in a case in our last three years' series.
7. The minimized trauma, agreeable anesthetic, followed by no post-operative complications, short and fairly comfortable convalescence produces a more desirable impression upon the patient.

BLADDER TUMORS.

A patient who has a bladder tumor that is not causing pain and that can be felt bimanually, may be given a reasonable assurance that this tumor can be removed by a few treatments with the high frequency current.—E. O. SMITH in *The Lancet-Clinic*.

INTRA-OCULAR NEOPLASMS: CLINICAL REPORT WITH SUBSEQUENT HISTORY COVERING FIVE TO TWENTY YEARS.

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New growths of the interior of the eye occur in two forms—sarcoma, generally found between the ages of 40 and 60, and glioma, always occurring in early childhood, often congenital, though said to have been seen as late as the twelfth year.

According to Fuchs, carcinomata and adenomata have also been observed in the choroid as a great rarity, but only as secondary tumors, mostly from the thoracic glands.

I have included in this report only those cases of neoplasm of which I have been able to ascertain the subsequent history a number of years later. It is this fact which will, I hope, render the report worth while; moreover, although not numerous, these cases emphasize the importance of early diagnosis and prompt surgery, and illustrate both a mistake of the surgeon, fortunately without ill-result, and a mistake of the patient, which probably cost her her life.

I submit records of two certain cases and one almost certain case of sarcoma of the choroid, three cases of glioma in one family of six children, and one of pseudo-glioma, erroneously diagnosed glioma. I have seen five or six cases of glioma altogether, but I have tried in vain to get the subsequent history of the others. I think only one recovered—a child about a year old with the growth still confined within the eye-ball and unilateral.

I.—Sarcoma of the choroid—well after twenty years.

On May 1, 1895, Mrs. S., age 60, consulted me on account of blindness in the left eye. Two years previously I had adjusted glasses correcting 3 D of hypermetropia in each eye and giving each perfect vision. I found the left eye blind from detachment of the retina, which the patient thought had existed for about six weeks. The tension appeared normal, there was as yet no pain, and the ophthalmoscopic picture was that of simple detachment. It was before the time of transillumination, so this diagnostic aid was not used. The age of the patient and the absence of both injury and myopia suggested a tumor. The family were told of this possibility and the patient advised to consult me from time to time. In a few months she began having attacks of pain in the eye and soon the tension became increased. The attacks became more severe and intensely painful. Enucleation was urged, but refused, until the

pain was said to be unbearable. Then in November, 1896, just eighteen months after her first visit on account of the blindness, I removed the eye-ball. I cut the optic nerve far back and fortunately, for if my scissors had hugged the sclera, I would have left behind a part of the growth. The tumor had perforated the sclera posteriorly and it protruded here as a smooth, dark prominence, about the size of a small pea. The microscope showed it to be a melano-sarcoma.

I exhibited the eye at one of our medical societies and some of the surgeons present (notably one who has since become a recognized authority on tumors and has written a book on Tumors of the Breast were of the opinion that it would be wiser not to insert a glass eye in such a case; nevertheless, I did insert a glass eye and the lady is alive and well today—twenty years later.

II.—*Sarcoma of choroid, with possible recurrence in orbit—well four years after operation.*

Mr. C., age 36, consulted me April 1, 1910. He had observed that the sight in his right eye was cloudy—"as if there was something in front of it"—for six or eight months. It had grown worse and was now nearly but not quite blind. The ophthalmoscope showed a dark brown mass projecting into the vitreous. It was easy to see by light thrown into the pupil by the Wurdemann transilluminator and so could be demonstrated to his physician and friends. I enucleated the eye on May 1, 1910. The patient returned home and subsequently a glass eye was adjusted. A year later, in May, 1911, he returned complaining of pain around the socket and some irritation in it. I found nothing very distinctive, but as there seemed to be a little nodule in the orbit, I excised it and submitted it to Dr. Hayes Davis. He thought it suspicious, but was not positive of its character, and sent it to Dr. Cyrus Field, of New York. His opinion was that the specimen was sufficiently suspicious to make it wise to exenterate the orbit. On June 1, 1911, I dissected out the orbital contents and curetted the walls. There has been no recurrence. I am told that after exposure the patient had some "neuralgic" pains on that side of the face and about the socket. I last heard from him in March, 1914.

III.—*Probable sarcoma of choroid—no operation—death from paralysis of the opposite side of the body nine years later.*

Mrs. H., age 56, consulted me May, 1901, complaining of blur before the left eye. The vision of this eye was 20/70; external appearance and tension normal. The ophthalmoscope showed a brownish-black tumor growing from the posterior portion of the ball into the vitreous. It presented the unmistakable appearance of a melano-sarcoma. I explained the condition to her daughter and advised enucleation; but in view of the still useful vision and the normal appearance of the eye I suggested that they would be better satisfied to have another opinion. Dr. J. M. Ray was the consultant and fully concurred as to the diagnosis and the wisdom of enucleation. I never saw the patient again and

am indebted to her daughter for the subsequent history. She wrote to me last March that her mother lost the sight of this eye, that it changed in appearance, and was frequently very painful; that about four years after I saw her she had a stroke of paralysis on the right side from which she made a fair recovery, until a second stroke five years later, after which she lived only a few months.

Of course, there is room for doubt as to the diagnosis in this case, and at first sight it might seem improbable from the duration of life and from the absence of marked exophthalmos and of the forward growth of the tumor, but, according to Fuchs, sarcoma may remain confined within the sclera for as much as five years; it may produce an iridocyclitis with shrunken globe instead of the acute glaucomatous symptoms (and in this event its growth is retarded) and it may extend along the optic nerve to the brain. This seems the probable course in this case from the changed appearance of the eye—"a change not generally observed, because she wore glasses"—the frequent painful attacks, the gradually developing blindness, and the paralysis on the opposite of the body. This history, together with the ophthalmoscopic appearance, which seemed so plain that two oculists advised prompt removal, leaves, I think, little room for doubt.

The frequency of sarcoma of the choroid is variously estimated at from 1 in 1,500 to 1 in 3,000 cases of ocular disease; remembering the great frequency of external ocular affections, it would seem unlikely that it would occur even once in 3,000 cases. It is generally seen between the ages of 40 and 60. It is always primary and unilateral. It seems to have very slight, if any, association with previous injury. Its course may extend over a number of years and is divided into four stages: first, when it is quiescent in the eye and is manifested by simple detachment of the retina, as in the first of the above cases, or by a growth plainly visible with the ophthalmoscope, as in the last two; second, usually a stage of increased tension with pain and other glaucomatous symptoms, but occasionally in place of this an iridocyclitis with retarded tumor development; third, the extension beyond the sclera, generally along the course of nerves or vessels, and, according to Weeks, most frequently posteriorly; and fourth, metastasis, most commonly to the liver.

The diagnosis, easy when the tumor is visible, as above described, may be difficult when the most conspicuous symptom is detached retina. Increased tension, the absence of myopia and injury, the age of the patient, a smooth detachment rather than a wavy one, and a dark spot shown by transillumination would point to tumor, but the tension is not always nor perhaps generally increased at first, the

retinal appearance may not be characteristic, and transillumination could not be used if the growth were at the back. In such cases we must await symptoms of the second stage.

Prognosis depends on early removal, but according to Weeks, 58 per cent. recur. One-third of the recurrences are local, two-thirds by metastasis. Most cases recur within three years, though one case is reported as recurring eleven years and five months after operation. In removing the eye it is important to cut the nerve far back.

IV.—*Pseudo-glioma mistaken for glioma of retina.*

In November, 1909, Mr. X. brought his little girl, age four years, to see me. Six months previously on covering the left eye, the child said she could not see; not much importance was attached to this speech, but lately she complained of not seeing with the other eye. She had been a perfectly healthy child, had never had a day's illness, nor even been indisposed with any minor affection. About a year previously she had a slight redness of and discharge from conjunctivae, which passed off in a few days.

Examination showed pupil regular and mobile; tension normal; vision: light perception in left eye, large objects in the right. Ophthalmoscope showed partial detachment of the retina in the right and complete detachment in the left eye and in each, but more marked in the left, a yellowish mass. The entire absence of any previous history of illness (given by father and mother of unusual intelligence), the round and mobile pupil without any signs of inflammation, the yellowish growth well developed in one eye and beginning in the other led me to strongly suspect glioma.

I gave an unfavorable prognosis as to sight and advised enucleation of the worse eye as being the safest course for saving life. Another opinion was suggested and a man whose experience is at least the equal of any in our city saw the case in consultation. He was even more sure and urged immediate removal of the worse eye. This, however, the family refused. The subsequent history of the case, as related in a very courteous and complete letter received from the father shows the disease to have been pseudo-glioma. He writes that the little girl, perfectly healthy previous to her blindness, in later years passed through measles, whooping-cough, and chicken-pox, but is now in fine health; that her sight is limited to light perception or little more; that the pupils are contracted and have a yellowish deposit in them, and that the left eye is worse than the right.

These cases of suppurative choroiditis without any external disease or injury of the eye are called by De Schweinitz "metastatic ophthalmitis," and by Fuchs "metastatic ophthalmia." They follow acute infectious diseases, especially meningitis and cerebro-spinal meningitis in children—more rarely the acute exanthemata. *The remarkable thing in*

the case just related is the entire absence of any symptom of previous illness as observed by the family of unusual intelligence (the father a druggist by profession). According to Fuchs, the ocular disease is generally caused by emboli, carrying streptococci and lodging in the vessels of the retina more often than in the choroid; less frequently the disease is due to direct extension from a meningitis along the sheaths of the optic nerve. Inflammatory symptoms, sometimes late in appearance, as in the case above described, occur in the course of the disease, producing adhesions of iris to lens, retraction of the peripheral part of the iris with deepening of this part of the anterior chamber and generally some ciliary injection. These symptoms are important in diagnosis, but Fuchs lays most stress on the tension which in glioma is at first normal and soon increased, and pseudo-glioma is soon diminished and followed by shrinking. Blindness generally results but in a few cases, mostly after meningitis, some sight remains.

V, VI, VII.—*Glioma of retina—three fatal cases in a family of six children.*

In November, 1909, Baby W., age three years, was brought to me with glioma in both eyes; in each the disease had already penetrated the globe and was growing rapidly as a red angry tumor in which the structure of the eye-ball was hardly to be distinguished. Enucleation was done simply to relieve pain. The child died two months later, the disease having returned in one orbit and rapidly advanced to adjacent structures. In a preceding baby in this family the disease was observed at a few months of age, but was confined to one eye; the eye was removed when three years old by Dr. Reddish, of Somerset, Ky., but the growth recurred in the orbit, extended to the superior maxilla, and death occurred two months after operation. The third child to have the disease was born October 24, 1912. The disease was noticed in the right eye at the age of two and a half months, the same as the other babies, and a few weeks later in the other eye. Both tumors protruded beyond the orbits; no operation was done; death eleven months after appearance of the disease. I am indebted to Dr. Garfield Howard for a history of these cases, only one of which was under my personal observation.

I have seen several other cases of glioma, but have tried in vain to ascertain their subsequent history. Glioma occurs once in 2,000 cases of ocular disease (Weeks). It is usually observed between the first and third years of life, but may be congenital and then is usually in both eyes; of those appearing after birth 10 per cent. are said to be bilateral.

The diagnosis will be made by the age of the patient (generally early infancy, rarely up to 12 years); the appearance of a yellow vascular mass

seen through the pupil either with the naked eye or with the ophthalmoscope, the absence of early inflammatory symptoms, and, as emphasized by Fuchs, the tension normal at first, but soon increased. In rare cases, as in the pseudo-glioma above described, the diagnosis may for a time be impossible. When in doubt and the eye is practically blind, enucleation is the wisest course.

Prognosis: "Of 143 cases collected from various sources, recovery at least three years after operation was found in 30 per cent.," according to Weeks; it is not stated at what stage these eyes were enucleated, but it would seem probable that most of them must have been removed while the growth was still intraocular. Fuchs attributes the disease to a congenital vice of development; he mentions a family in which two of the children had fatal glioma and a third had coloboma of the iris and choroid. Weeks quotes Wilson as having observed a family of eight children, all of whom had glioma.

Pathologically, glioma is described by Flexner as neuroepithelioma. Lindenfeld, in Graefe's Archiv., 1913, reports what is alleged to be a third case of spontaneous cure of glioma retinae, effected by complete tumor necrosis, followed by phthisis bulbi. In this case the disease was diagnosed in one eye histologically and in the other clinically only. Perhaps some doubt is permissible as to the correctness of the diagnosis, and certainly it would be wise to accept the dictum of Weeks that all cases of glioma will end fatally unless the globe is removed in the first or early in the second stage of the disease—the stages corresponding to those above described in sarcoma.

THE USEFUL SURGEON.

Clinical experience alone will not make a competent surgeon unless he takes the time to thoroughly investigate each case as to the cause and pathological conditions involved, applies recognized methods of treatment and follows the results of his treatment. Too often we find that the so-called surgeon has an extensive practice and he does not take the time required for the proper care and study of cases. However, he gets along mechanically through much operative work, but of what use is such a man to progress, and to the ultimate results of his case? Of what use is he as a teacher of medical students, to the development of proficiency in himself or his assistants? He should let his assistants do the minor and routine work, while he devotes himself to the real progress of surgery. H. W. WIGHTMAN in the *Medical Record*.

RAYNAUD'S DISEASE: WITH A REPORT OF A CASE.*

W. C. GEWIN, M.D.,
BIRMINGHAM, ALA.

This disease, first described by Maurice Raynaud in 1862, and later given the name of Raynaud's disease by Laveran, is due to a local stagnation of blood occurring at the periphery of the circulation, and is probably vasomotor in origin. It is seen in three different grades or degrees of intensity, viz.: (1) local syncope, (2) local asphyxia, (3) local or symmetric gangrene.

Local syncope is the most common form, and is most often observed in the extremities, producing what is known as "dead fingers" or "dead toes." There are pallor and coldness of the parts affected, and slight anesthesia is usually present. The part has a shrunken appearance, is stiff, and frequently painful. Raynaud suggested that local syncope is caused by a contraction of the blood-vessels of the part involved. This condition is analogous to that caused by intense cold. It usually passes away after a few hours, but returns again and may become almost a constant symptom.

Local asphyxia usually follows local syncope, but sometimes appears as a primary condition. As in local syncope, the fingers and toes are the parts usually affected. The part becomes livid and cyanosed, and there are present numbness, swelling, and more or less pain. When the attack has worn off the affected parts assume a bright red color from the overactive circulation. Recurrences are common, especially during cold weather. This condition is probably due to a stagnant circulation caused by dilatation of the venules and capillaries, with a constant spasm of the arterioles. The paroxysm may last only a few minutes, or it may last hours, and even days. There may be but one attack, or the attacks may recur from time to time, extending over a period of a few weeks, and sometimes even years. Pain is usually a predominant symptom, and may precede, accompany, or follow asphyxia.

Local or symmetrical gangrene is a spontaneous form of gangrene occurring during the course of Raynaud's disease. It usually follows local syncope and local asphyxia, and but rarely occurs without previous vasomotor disturbance. As originally described by Raynaud, it is theoretically symmetric, but, practically, this is not always true. Following the usual vasomotor symptoms, small black areas of necrosis appear on the ends of the fingers, or toes, or more rarely on the nose, ears, cheeks, mammae,

*Read before the Jefferson County, Ala., Medical Society.

and buttocks. The gangrenous area is usually small, leaving a scar after it has healed. Rarely, the entire finger or toe may be involved, and spontaneous separation takes place. When the gangrene is of a more severe type, the areas of necrosis gradually extend to the adjacent tissues and deeper parts.

CASE REPORT: T. C., colored, age 43 years, a patient of Dr. M. C. Schoolar, height 5 feet 7½ inches, average weight 150 pounds. Present weight, 145 pounds. Father died of "senility" at the age of 80 or 85 years. Mother died of "dropsy" at the age of 45 or 50 years. Two brothers killed acci-



dentally at the age of 28 and 43 years, respectively. Two sisters living and in good health, and two died when infants.

Health during childhood was good. Had smallpox at the age of 30. Has had gonorrhea, but denies syphilitic infection. He first noticed the present trouble in January, 1906. The initial symptom was pain in the extreme end of the right great toe. About one month later he noticed a very small black spot on the end of the toe, which slowly grew larger. The pain was severe at times. He consulted Dr. West, of Live Oak, Fla., before the appearance of the black spot, who, he says, prescribed a solution of salicylic acid locally. In April, 1906, he consulted Dr. Moore, of Centerville, Ala. At this time the black spot was about the size of a dime. In May, 1906, he consulted Dr. Ransom, of Birmingham, Ala., who amputated the toe. With the exception of a burning sensation of the foot, he had no further trouble until February, 1907, when the big toe of the left foot began in just the same way as did the toe of the other foot. This toe was amputated in October, 1907, by Drs. Schoolar and Moore, of Centerville, Ala. In December of 1908, the fifth toe of the right foot became involved, and was amputated in February, 1909, by Drs. Williams and Peters, of Centerville, Ala. The second toe of the left foot began to give trouble during the early

part of 1910, and was removed by Drs. Williams and Peters in June of the same year. The third toe of the left foot was amputated by Drs. Williams and Peters in June or July, 1911. The right foot was amputated through the tarsal bones by Drs. Williams and Peters in January, 1912. The right leg was amputated by Dr. Stover, of Little Rock, Ark., in June, 1912. The second finger of the right hand became involved in December, 1912; the finger nail came off, and the end of the finger suppurated, but was entirely healed by the latter part of February, 1913. Necrosis again appeared on the end of this finger in November, 1914. A few days later the first and third fingers of the right hand showed evidence of necrosis. During the early part of December, 1914, he consulted Dr. M. C. Schoolar, of this city, who referred him to me, with a diagnosis of Raynaud's disease. On December 31, 1914, with the assistance of Dr. Schoolar, I amputated the first finger between the first and second joints; the second finger at the first joint, and the third finger between the second and third joints. He left the Birmingham Infirmary on January 3, 1915, and at the present time the wounds are apparently in good condition, but there is beginning gangrene of the fourth finger of the same hand.

COLOPTOSIS AND PROSTATIC DISTURBANCE.

I have had several cases in which ptosis of the large bowel, but particularly in which redundancy of the sigmoid, has obviously been an exciting cause of disturbance of the prostate. In these cases the patient is generally more comfortable in bed, but the moment he assumes the erect posture, the pressure on the prostate causes great discomfort, which is only slightly relieved by urination. Defecation, however, if thorough, brings complete relief, which lasts until the sigmoid or the transverse colon, as the case may be, again becomes loaded. If the rectum is examined at this time it will be found empty, showing that the pressure comes from higher up. In three cases of this kind, resection of the redundant sigmoid has been followed by complete relief, while the symptom has disappeared with others in several other cases following reposition of the ptotic colon.—CHARLES A. L. REED, in *The Lancet-Clinic*.

CHRONIC CHOLECYSTITIS.

Chronic cholecystitis with recurrent attacks, in the absence of other conditions, certainly warrants operative interference. I have very little faith in medicine under these conditions or treatment at the various watering-places.—JOHN B. DEEVER in *The Therapeutic Gazette*.

PELVIC KIDNEY—PYONEPHROSIS WITH STONES: A CASE REPORT.

W. KOHLMANN, M.D.,

NEW ORLEANS.

Abnormal development of the genito-urinary system is more frequent than of any other part of the body, a fact which is not generally appreciated.

In the diagnosis of the abnormalities of the kidney, the associated anomalies of the general system are to be drawn into consideration, as they are developed together and caused by defects in development in the early embryonic stage. Such conditions are frequently found associated with congenital atresia of anus, double or bicornate uterus, absence of vagina, uterus, etc. Craven Moore estimated the frequency at 33 proc. Guizzetti and Parizet report fifty-eight cases of anomalies of the kidney; they find in those cases where a horseshoe kidney exists the genital organs are normal, whereas in those cases of congenital dystopia malformations of the genital organs are frequent, especially absence of the vagina and uterus.

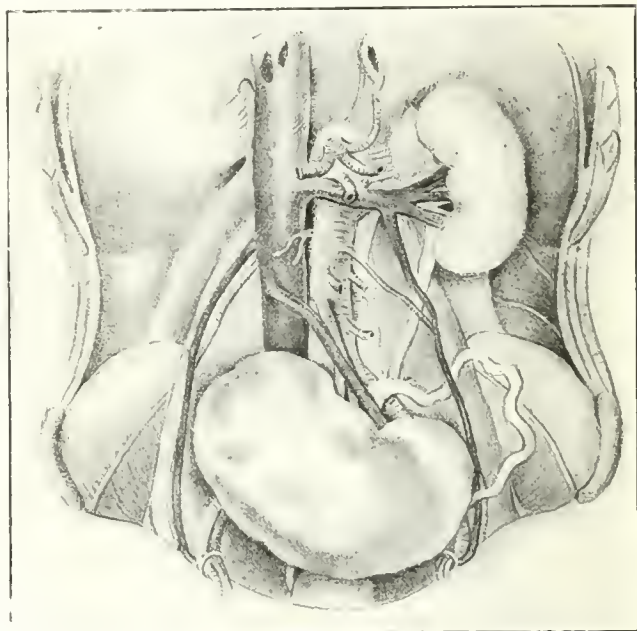
When congenital anomalies are present, an existing abdominal tumor should awaken a suspicion of an ectopic kidney. In spite of the fact that there are indications in the anamnesis to permit a probable diagnosis, such a diagnosis, as a rule, is not made before the operation except in the minority of cases. Most of the reported cases are accidental findings in the course of operation on the kidney or other abdominal organs, or are contained in post-mortem reports.

The subject has to be kept more in mind by the diagnostician and with the assistance of the improved technic of cystoscopy and radiography, no doubt such diagnosis will be made more frequently, as in a case recently reported by Thomas in the *Annals of Surgery*, where the diagnosis was made by colloidal silver injection.

In the following case the diagnosis was not made, although the possibility of such a condition was considered on account of the urinary findings. A careful clinical examination was not possible on account of the critical condition of the patient, who presented symptoms of an acute surgical abdominal disease; immediate operation was deemed necessary.

Mrs. J. D. B., age 24, married. Admitted to Charity Hospital, December 9, 1914. Anamnesis: Was always in good health until about six months previous to admission, when she began suffering with abdominal pains, at times complicated with frequent micturition. Is suffering from a rectal fistula following an operative procedure about three months prior to admission. Has never menstruated. Present status: Fairly well nourished female;

breasts well developed; abdomen distended and painful on slightest touch, especially in pelvic region. Examination of the genital organs shows in the region of the vaginal opening only a slight depression of the skin, about one-fourth of an inch in depth. A small fistulous canal leads from this depression into the rectum. By rectal examination neither uterus nor ovaries are palpable; a large mass filling the pelvic cavity can be made out, but on account of the extreme sensitiveness on abdominal palpation the possibility of any diagnosis is excluded. Temperature from 100° to 102°. Urinalysis showed pus cells and traces of albumin.



Operation December 12, 1914: Median abdominal incision below the umbilicus about four inches in length. Examination showed absence of uterus; ovaries were found of normal size situated high in the abdominal cavity, the right in the line of the umbilicus and the left a little lower.

The left kidney was found in normal position and of normal size. On the right side no kidney was found. The whole pelvic cavity was found filled by a large mass, apparently retro-peritoneal. Upon dividing and pushing back the peritoneal covering the tumor could be recognized as a pelvic kidney. After the renal artery and vein, originating rather low, were tied, the tumor could be loosened and removed. The ureter was greatly dilated and was entirely displaced to the left side on account of the size of the tumor.

The tumor after removal was the size of a fetal head and was filled with pus and stones of varied size.

Involuntary urination very often means a distended bladder, and in old men it should at once indicate an examination into the condition of the prostate. Vomiting, too, is often caused by distention of the bladder.

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WALTER M. BRICKNER, M.D., Editor

NEW YORK, MAY, 1915.

THE REMOVAL OF NEEDLE FRAGMENTS FROM THE SKELETAL MUSCLES.

The removal of small foreign bodies, usually fragments of needles, from the hand, foot, or other parts of the extremities, is one of the most common operations that physicians are called upon to perform. Regarded as a minor operation, there is nevertheless no procedure in the entire field of every-day surgery that makes a larger demand upon skill, patience, and precision. The often-seen infections of hashed muscles and fasciae following a frenzied, fruitless search for the elusive "needle in a hay-stack" are eloquent of the truth of this statement, which, indeed, we are sure our readers are ready to concede from their own experiences.

Recent literature contains various articles on the employment of the compass and magnetized needles in locating steel and iron bodies in the tissues. These, and the electro-magnet itself, may be occasionally a little helpful, but their aid is small and often *nil*. The essentials to a successful, clean removal of a buried foreign body are accurate localization and a systematic dissection conducted in good light, through a bloodless, anesthetized field, with the aid of patience and an ungloved finger-tip!

In the first requirement, localization, much can often be determined by considering the point of entrance and the anatomy of the underlying tissue, the nature of the foreign body, the conditions under which it entered, the time elapsed since the accident, and the local reactions, if any, that have devel-

oped (pain, tenderness, infection.) *Circumscribed* tenderness is especially significant, making allowance, of course, for tenderness due to infection, if there be any. Pressure with a probe may elicit a single spot of tenderness or a point of maximal and other points of lesser tenderness. The single or maximal point suggests the location of the most superficial part of the foreign body, and the points of lesser tenderness map out, in a general way, its direction. These clinical signs, not always obtainable to be sure, are less apt to deceive than a hastily conducted fluoroscopic examination or a single roentgenogram.

On the other hand, a properly conducted roentgenography is the best means of localization of glass and metal bodies (wood splinters are usually easily located by palpation, probing or dissection), and should always be employed before cutting down upon such a body unless its superficial location is quite evident.

Systematic fluoroscopy (the examiner being properly protected) is very helpful, indeed, in locating foreign bodies in the smaller parts, as the hand, foot, and forearm. By moving the part about before the screen and noting the comparative excursions of the shadows of the body and the bone, one can definitely determine their relation to each other, the direction and length of the body, and the depth of its extremities. Bismuth powder dusted in the skin folds will afford the means of determining the depth of the body from the surface. A single roentgenographic picture is far less useful than such a fluoroscopic examination. Pictures taken in two right-angled directions are more helpful, but still very insufficient. Stereoscopic pictures, especially if the skin creases are dusted with bismuth, will furnish a precise demonstration of the length, direction and depth of the body and its position with reference to the bone and the skin.

But even this clear demonstration, this visualization of the object in the depth, cannot be transferred to the surgical wound with such exactness that, without nice dissection and careful technic, the body can be found. There are no landmarks in the tissues from which to make measurements, except the bones; and there are no means of obviating the quarter-of-an-inch miss that "is as good as a mile." The stereoscopic picture does not lie, nor do the demonstrations of a painstaking fluoroscopic study; these must be projected mentally into the wound, but they carry no calipers with them, and require, therefore, a deliberate, systematic operation to lead to sure success.

The hoary advice to make the incision across the

axis of the needle is good only if the object is quite superficial. Otherwise the incision should be in the line of the underlying muscle fibers. Fascial planes should be cut and retracted; tense strands of fascia feel much like the sought-for needle, just as small veins often look like the buried bit of steel. The muscles in their turn should be bluntly divided and retracted, the operator himself inserting the instruments, and thoroughly but very delicately palpated with the naked finger-tip. Sponging is to be avoided, if possible, and is unnecessary when a constrictor can be employed.

At each step of the search the manipulations should be thus gentle and deliberate, guided by a definite mental picture of the roentgenographic demonstration, and a careful regard for, and precise knowledge of the anatomical structures in the neighborhood—muscles, fasciae, nerves, and blood-vessels. It is when the operator is most apt to become impatient that he needs his patience most. Reckless, fretful chopping up of the tissues, far from discovering the needle, is most apt to make its discovery all the more difficult. With patience and deliberation, careful localization, nice dissection, and palpation will almost always lead to success; unless one has more luck than skill, a hasty localization and a haphazard or crude operation will yield only disappointment, disfigurement, and infection.—W. M. B.

CANCER NUMBER.

At the request of the Cancer Commission of the Medical Society of the State of Pennsylvania, and as an aid to its efforts, the July issue of THE JOURNAL will be devoted, in part at least, to cancer.

We solicit for that issue informative contributions on the early diagnosis of cancer, the treatment of its various forms, cancer statistics, etc.

Surgical Suggestions

The employment of a tourniquet greatly facilitates operations on the extremities, and is applicable for most of them.

Compound tincture of benzoin (Frier's balsam) will form a protective film on mucous membranes and moist surfaces, just as collodion does on the dry skin. It is useful in coating fissures and protecting other wounds of the mouth or anus.

Chiropodists' adhesive plaster strips, obtainable on spools, supply a neat and convenient means of fastening bandages of the fingers and toes.

Surgical Sociology

Ira S. Wile, M. D., Department Editor.

SOCIALIZING THROUGH FIRST AID TEAMS.

The general tendency toward the enactment of workmen's compensation acts is accompanied by numerous activities on the part of employers to prevent accident and disease among their employees. The Monthly Bulletin of the American Iron and Steel Institute indicates how thoroughly interested some employers are in this work. Every step that will prevent infection of a wound is considered as meriting careful attention and constructive organization.

Of the 15,000 cases in which awards were made by the New York State Compensation Commission during 1914, 2,100 cases were examined by the medical department. Of these a little over 14 per cent. were due to septic infection. Had it been possible to prevent this infection in one out of every six injured, probably the large majority of these cases would have recovered within the period prescribed by law for non-compensatable minor accidents. The possibilities of preventing infections are manifest in the experience of the American iron and steel industry, where formerly about half of the wounds were infected, while to-day little more than one per thousand cases of injury become infected. The saving in time, the decreased payment of compensation, the prevention of deformities and invalidism indicate the economic worth of first aid to the injured.

It is enlightening to realize that competition in first aid work exists in the mining industry and in the iron and steel industry. The first aid teams are organized, trained, and developed to a high state of efficiency in the various industrial plants so that the well-intentioned employees may be of prompt and effective service to their injured co-workers.

To illustrate, the Ellsworth Collieries Companies in 1912 trained 104 men in first aid work, and in 1914, 180 men. Three squads of six men were trained in the use of oxygen helmets. Forty-one men received first aid certificates from the United States Bureau of Mines, while six teams made 100 per cent. in the third annual mine safety demonstration with the judging done under the auspices of the American Red Cross Association.

As a result of the various precautions taken for the prevention of mine accidents, the installation of mechanical safety devices, general instruction in mine safety, and the equipment throughout the mine are responsible for the reduction, by 50 per cent., of the accidents within the last six months.

The Cambria Steel Company maintains a first aid instructor devoting his entire time to this work. First aid emergency boxes are conveniently placed at numerous points throughout the plants. As a result of this intelligent attack upon the accident situation, the Cambria Hospital reports that injured men reach the hospital in better physical condition than in former years. The rate of infection has

been decreased to one-quarter of one per cent. of the cases that were handled. Each year about twelve teams of six men each compete for the first aid plant championship. The employees co-operate very actively, realizing that this is a practical scheme for their own protection and betterment.

The Empire Steel and Iron Company has organized a general safety committee composed of superintendents of all divisions and sub-committees composed of foremen and employees at each plant. Inspections and installation of safety devices are in the hands of the general safety committee. To the sub-committees is entrusted the education of their fellow-workmen in problems relating to safety. The results of their general campaign is indicated by the fact that while the number of men shifts employed in 1914 was 50 per cent. higher than in 1913, the number of accidents during 1914 was decreased by 11.6 per cent.; the time lost on account of accidents decreased 12 per cent., and the benefit money paid employees for injury employers' liability act decreased 56 per cent.

Such facts and figures impress themselves upon employers and employees alike as the evidence of industrial protection leading to a better understanding of the social value of human beings in the terms of industrial welfare. The economic value of a man from the standpoint of the state is not the only consideration.

It requires little thought to appreciate the fact that decreasing the number of industrial accidents redounds to the welfare of the families of the employees and lessens the degree of family impoverishment through the necessities of unemployment and invalidism.

First aid to the injured has become an economic project. It may be thoroughly divorced from all thought of philanthropy, be freed from the influences of emotional sentimentality, and stand forth as a purely economic project. Large employers of labor are to-day concerned in conserving the lives and limbs of their employees because it pays. It is good business. It is a sound industrial policy. This is no stricture upon the motives of industrial concerns. Whatever is best for society as a whole will slowly be recognized as a practical industrial economic paying proposition.

Safety devices, first aid packages, rescue teams for mines, and trained workers in first aid simply indicate that the prevention of accidents, the limitation of infection, the prompt control of hemorrhage, and various other procedures are recognized as essential forms of welfare work to be undertaken and controlled in hazardous industries. In the interests of employees and employers, modern antiseptic surgery is playing its part in the socialization of industry.

There are two operations in which the surgeon may wisely elect to dispense with rubber gloves, viz., in suprapubic prostatectomy and in searching for a buried needle.

Book Reviews

Progressive Medicine. Edited by H. A. HARE, M. D., Professor of Therapeutics, Materia Medica and Diagnosis in the Jefferson Medical College, Philadelphia; assisted by LEIGHTON F. APPLEMAN, Instructor in Therapeutics, Jefferson Medical College, Philadelphia, March 1, 1915. Philadelphia and New York: LEA AND FEBIGER.

This number contains the following reviews: Surgery of the Head and Neck, by Charles H. Frazier; Surgery of the Thorax, excluding diseases of the breast, by George P. Muller; Infectious Diseases, including acute rheumatism, croupous pneumonia, and influenza, by John Rührah; Disease of Children, by Floyd M. Crandall; Rhinology and Laryngology, by George B. Wood; and Otology, by Truman L. Saunders. As usual, in these numbers, all the reviews deserve the highest praise.

Federal Narcotic Record Book. For Physicians, Dentists and Veterinarians. Chicago: THE ABBOTT LABORATORIES, 1915. Price, 25 cents.

A convenient book for recording narcotics on hand and those dispensed, as required by the Harrison law, the essential features of which are also set forth.

"Swat the Fly," a One-act Fantasy by ELEANOR GATES, author of "The Poor Little Rich Girl." New York: THE ARROW PUBLISHING Co., 1915. Price, 25 cents.

A whimsical dramatic portrayal, cleverly conceived, of the dignity and importance of animal experimentation, the inconsistencies of the anti-vivisectionist, and the menace of the disease-disseminating fly.

Progress in Surgery

A Résumé of Recent Literature.

Intestinal Obstruction; an Experimental Study of the Causes of Symptoms and Death. F. T. MURPHY and B. BROOKS, St. Louis, *Archives of Internal Medicine*, March 15, 1915.

1. In intestinal obstruction, the content of the obstructed bowel contains a toxin, which, when absorbed in sufficient amounts, produces definite symptoms and pathologic lesions and death. 2. The toxins are the result of bacterial growth. They are not specific for any part of the intestinal tract, and may be formed in the gall-bladder. 3. The chemical and physical characteristics of the toxic substance may vary with the length of time which the obstruction has existed, as well as the different conditions under which the obstruction occurs. 4. The toxin may enter the circulation by way of the thoracic duct. 5. Death after intestinal obstruction is the result of a toxin, which may be independent of infection of the peritoneum, vity or general circulation. 6. The toxic substance does not pass through the normal mucous membrane. 7. In the production of symptoms, the factors which make this absorption possible are more important than the factors which produce toxin. 8. Interference with the circulation of the obstructed intestine is an essential factor in following this abnormal absorption. 9. Simple obstruction of a segment of duodenum or jejunum results in earlier and severer symptoms than a similar obstruction of the ileum because the secretion into the lumen of the former leads to rapid distension and circulatory disturbance in the bowel wall. 10. The symptoms and pathologic lesions following the intravenous administration of the contents of a segment of bowel after obstruction are the same as those described, resulting from intravenous injection of certain of the ptomaine poisons. 11. In the surgical treatment of cases of intestinal ob-

struction, that part of the intestine with a mucous membrane which has been so damaged as to permit of abnormal absorption should be resuted rather than drained.

The Pre-Operative Diagnosis of Tubercular Mesenteric and Retroperitoneal Glands. E. H. RISLEY, Boston, *Boston Medical and Surgical Journal*, February 18, 1915.

1. *Tuberculosis mesenterica* is often a primary disease with sometimes a fairly distinct clinical history and signs. It most often simulates acute appendicitis, and when in this stage should demand surgical intervention.

2. In the absence of palpable glands, however, it is impossible to make a correct pre-operative diagnosis in many cases, there being no symptom-complex distinctive enough of this condition.

3. A great many people harbor tubercular mesenteric glands in various stages of activity without symptoms.

4. The disease has two clinical types: (a) a slowly progressing one, generally with palpable glands; (b) an acute fulminating type, most often simulating and impossible generally to differentiate from appendicitis.

5. The prognosis in the subacute stage is good without operation. In the acute stage exploratory laparotomy should be done, but the glands not removed unless there are definite indications either from adhesions, ulceration or size of mass producing pain or mechanical obstruction.

6. In children and young adults with a history of right-sided abdominal pain, with or without palpable masses, *tuberculosis mesenterica* should always be considered as a possibility.

Gall-Stones During the Course of 1,066 Abdominal Sections for Pelvic Disease. REUBEN PETERSON, Ann Arbor, *Surgery, Gynecology and Obstetrics*, March, 1915.

The author says that when the abdomen is opened for pelvic disease, the gall-bladder should always be palpated except the condition of the patient or the possibility of contaminating clean peritoneum forbids it. In from 10 to 15 per cent. of the cases, gall-stones will be found, their frequency depending upon the patient's age rather than upon the character of the pelvic disorder. Eighty-four and four-tenths per cent. of the 135 cases with gall-stones in the present series had borne children. In Peterson's experience, gall-stones removed at the time of pelvic operations leave from 85 to 90 per cent. of the patients free from symptoms referable to the gall-bladder; while if, for any reason peculiar to the case, the calculi are left, 30 per cent. of the patients subsequently complain of this condition. Peterson therefore advises that gall-stones should always be removed if this can be done without additional risk to the patient.

The "Acute Abdomen" in Children. D. N. EISENBRATH and ALFRED A. STRAUSS, Chicago, *Illinois Medical Journal*, April, 1915.

There are points of difference between the various acute abdominal conditions in adults and in children. The failure of proper rotation of the cecum, for instance, the likelihood for acute tuberculosis in the abdomen, the relative frequency of intussusceptions—these and other conditions prompt these authors to emphasize the need for bearing in mind a clear outline of the possible surgical diagnoses in acute conditions of children. They suggest thinking of the viscera likely to be involved and they present the following classification based upon a large variety of cases observed:

I. 1. Inflammations of an appendix attached to a fully rotated cecum. 2. Inflammations of an appendix attached to a cecum which is not rotated, i. e., lies just below the liver. 3. Inflammations of an appendix lying in the true pelvis and complicated by ileus due to kinking of the terminal ileum. 4. Acute tuberculous infection of the appendix, simulating ordinary acute pyogenic infection. 5. Acute inflammations of the lymph glands along the iliac vessels.

II. Acute infections of the liver.

III. Acute infections of the intestines. Obstructions

due to (a) intussusceptions (most frequent of all); (b) persistent Meckel's diverticulum (rare); (c) kinking of coil around inflamed appendix; (d) strangulation of hernia (relatively rare).

IV. Acute infections of the peritoneum. (a) Acute pyogenic conditions secondary to appendicitis, gangrene of ovarian cyst followed twisted pedicle, or inflammation of Meckel's diverticulum; (b) acute tuberculous peritonitis. This outline will be helpful. One must remember the role which persistent embryologic structures play. Pain and tenderness are least marked in the youngest children, also vomiting. Rigidity is not a reliable symptom for young children but tympanitis appears early and is pronounced. The leukocytosis is often puzzling rather than of any direct aid. Rectal examination should never be neglected.

The Boas-Oppler Bacillus and the Diagnostic Importance of Its Presence in the Gastric Contents. GRAHAM CHAMBERS, Toronto, *The Canadian Medical Association Journal*, March, 1915.

The results of the author's experience indicate that the lactic acid bacilli are present in the test-meal of the great majority of cases of cancer of the pylorus in which there is absence of free hydrochloric acid. The bacilli are frequently present in malignant ulceration of the stomach, in which there is absence of free hydrochloric acid in the gastric contents, and this may be so in either the presence or absence of pyloric obstruction. In a considerable proportion of cases of gastric cancer in which a small amount of free hydrochloric acid is present Boas-Oppler bacilli are found.

The absence or deficiency of Hcl thus seems to favor the growth of the bacilli, but occasionally their growth sets in without any change in the acidity of the secretion. The necrotic and ulcerating processes, frequently present, seem to form a nidus for the growth of the bacilli.

Twelve Commandments to Avoid Crippling in Our Wounded Soldiers. PROF. RITSCHL, Freiburg, *Medizinische Klinik*, February 7, 1915.

The following instructions have been printed on a placard to be hung in hospitals in Germany:

1. Remember that rest of joints (stiffness) and muscles (atrophy and weakness) is harmful.

2. Do not depend on orthopedic mechanical after-treatment, but attempt to avoid it by your results. In severe cases, however, refer your patient to mechanotherapy as early as possible in order to save time, trouble and money.

3. Avoid keeping joints in one position; move them as soon as the fracture is healed (change angle of joints; use passive motion).

4. Attempt to retain the valued power of the muscles by the very early use of massage, electricity and active movements, both with and without resistance, performed under your supervision.

5. Remember that extensors atrophy much more rapidly than flexors. Above all, try to keep the deltoid and the quadriceps femoris intact, as the arm and leg without them are of little use.

6. If on account of severe injury to soft parts prolonged immobilization becomes necessary, place the joints in a position in which, if ankylosed, they will be most useful: (Shoulder In the position afforded by an ordinary sling.

Elbow At a right angle

Forearm In pronation

Wrist Over-extended as in writing, or as in clenching the fist.

Fingers Slightly flexed

Hip Slightly flexed and abducted

Knee Slightly flexed.

Ankle About at right angle and slightly rotated inward.

7. Avoid allowing the wrist to fall into continued flexion when the arm is carried in a sling, since if permanent, tight closure of the fingers is prevented.

8. Keep fingers limber. Don't overbandage them and don't forget to tell the patient to keep them in motion.

If possible retain some sort of grasping organ (Greifzange), for an artificial hand is insensible.

9. Stimulate circulation, especially in individuals confined to bed, by means of movement of the limbs and by deep breathing; for increased blood supply stimulates internal organs and increases their regenerative capacity.

10. Remove extravasated blood as soon as possible (elevation, massage, heat, hydrotherapy), for coagulated blood causes irritation, leading to adhesions and when present in large amount to fibrous bands. The latter, however, cannot, as a rule, be entirely removed. Remember that the absorption of blood and lymph is most impeded in the distal parts of the limbs, and that the spontaneous absorption in this location must always be supplemented by artificial means.

11. Do not consider it below your dignity, in doubtful cases and in cases where your own technical ability is insufficient, to call in a more experienced practitioner, for by this means not only do you increase your knowledge, but the patient is benefited.

12. Don't neglect mechanics, for our body is a mechanical marvel. Only that person is fitted to repair a complicated machine who understands its mechanism and who is himself a good mechanic.

The End-Results in One Hundred Cases of Fracture of the Elbow; Immobilization in Hyperflexion Combined with Early Passive Movements and Massage. HAROLD NEUHOF and HEINRICH F. WOLF, New York. *Surgery, Gynecology and Obstetrics*, March, 1915.

By hyperflexion, the authors mean not merely acute flexion, but the most acute flexion in which the elbow can be fixed without obliterating the radial pulse, following the reduction of the displaced fragments. Mobilization and massage must be practiced only if they are painless. The treatments consist in gentle stroking massage and slight flexion and extension movements at the elbow. There must be no sudden movements and after each treatment the elbow is fixed in hyperflexion. Treatment may be tentatively begun on the fourth or fifth day after the accident. In forty cases, the authors had twenty-three perfect results.

The Operative Treatment of Fractures. A. R. SHANDS, Washington, D. C. *Virginia Medical Semi-Monthly*, January 22, 1915.

Shands here expresses the conviction, reached after sixteen years of additional experience, that his early enthusiasm in favor of open operation in cases of fracture was celestial fire burned to a false god; for, apart from the fact that the results of operation are no better, often not as good, the danger of sepsis, despite care and good technique, is too grave to be lightly invoked. The reason for the danger is obvious: the traumatized tissue, ever present in a recent fracture, is unable to resist the low grade pus germs often conveyed to the seat of the injury by the blood current; the devitalized tissue, which is unable to absorb the serum and clotted blood, sloughs off, giving rise to a sero-purulent discharge that retards callus formation, resulting in non-union, and often in septic pneumonia. Only after conservative measures have been tried and have failed should operation be resorted to. Three or four weeks after the fracture will not be too late.

And yet there are fractures, such as of the patella, the olecranon, certain conditions of the elbow and shoulder joints that call for operation to obtain anything like good results; in the first two, open operation and the use of absorbable suture is recommended as a routine practice. The danger in trying to manage fractures involving the anatomical neck of the humerus by manipulation is that it can rarely be done without exposing the fragments. Then, too, soft tissues are often jammed in between the bones. The retention of the fragments, once they are placed in proper position, is not difficult. Shands recommends that in easy cases a suture of fine wire be used; in difficult ones, a spike. This latter is often allowed to project through the skin to be pulled out when the bone is anchored by callus, say in about three weeks. In either case the arm is placed in adduction, held against the chest, leaving the locking of the serrations of the fragments to maintain the reduction. Later the arm is held

in abduction with light plaster-of-Paris spica bandage. He advises, whenever the fracture is complicated with subluxation, the removal of the head of the humerus. Massage and passive motion should be begun as soon as union is established.

Fractures of the elbow, of which the most common is the supracondylar, require operation. After a two-inch longitudinal incision, the assistant makes long traction while the condyles are pried into position by means of a broad bladed periosteal elevator. The serration of the fragments having become engaged, the forearm is flexed to an acute angle on the arm and confined to that position for three weeks, when massage and passive motion should be begun.

In many fractures of the forearm, especially where the radius is involved, functional results can be attained only through an open wound. If the fracture is between the insertion of the pronator and supinator muscles, perfect alignment may result after rotation of the upper and lower fragments—a condition which, if not corrected, will result in the destruction of pronation and supination. An operation, with a snugly fitting plaster-of-Paris cast, confining wrist and elbow, will bring about good function.

In Colles's fracture after the operation, the plaster cast should be so applied as to give free use to thumb and fingers, thus preventing stiffening.

In fractures of the femur Shands recommends that reduction be accomplished by means of a traction apparatus under a general anesthetic; then the application of the plaster-of-Paris bandage from the nipples to the toes. Then x-ray pictures must help one to decide whether the position is correct. As to fractures at the neck of the femur, operation is justifiable in case of non-union.

Experiments in the Production of Abortion and Labor by Use of Placental Extracts. ARTHUR H. CURTIS. *Surgery, Gynecology and Obstetrics*, March, 1915.

Curtis finds experimentally that extract of human placenta in normal salt solution is oxytocic for pregnant guinea-pigs and rabbits; and defibrinated blood from pregnant and puerperal women possesses similar properties in a lesser degree. Normal salt solution or defibrinated blood of non-pregnant women does not disturb the pregnancy. Finally, extract of guinea-pig placenta in normal salt solution seems to be slightly oxytocic for pregnant guinea-pigs, although no influence was exerted by blood from pregnant or puerperal guinea-pigs.

The Radium Treatment of Fibroid Tumors. HOWARD A. KELLY, Baltimore. *Surgery, Gynecology and Obstetrics*, March, 1915.

Kelly concludes that massive radium treatment of uncomplicated fibroid tumors stops the excessive flow and in younger women may regulate, without stopping it. It reduces the size of the growths, relieves pressure symptoms, and may even cause large tumors to disappear. If radium is tried and fails, operation can be undertaken without additional risk, which is not always the case, however, in cases of cancer of the cervix. Kelly believes that with increased experience and improved technic, most patients may be relieved of hemorrhage and that, roughly speaking, nine cases out of ten the tumor may be done away with without serious discomfort or risk.

Complete Removal of Adenocarcinoma of Uterus by Exploratory Curettage. L. J. LADINSKI, New York. *Surgery, Gynecology and Obstetrics*, March, 1915.

Ladinski reports three personal cases and reviews the literature at length. His specimens were all examined by competent pathologists and in all of them it appeared that the small neoplasm had been completely removed by the curette. The author raises several questions of interest to those engaged in pelvic surgery.

Ovarian Tumors in Pregnancy. W. C. DANFORTH, Evanston. *Surgery, Gynecology and Obstetrics*, March, 1915.

While ovarian tumors are not especially common during pregnancy, they must not be overlooked. Removal should

be undertaken as early in pregnancy as possible, the danger to the mother being practically nil. The danger of abortion is not great, less so than expectant treatment. Complications, such as twisting of the pedicle, rupture or suppuration, demand immediate operation.

Tubercular Infection Complicating Pregnancy, Parturition, and the Puerperal State, with a Consideration of Its Bearing on Treatment. E. P. DAVIS, Philadelphia. *The Therapeutic Gazette*, March 15, 1915.

Tubercular infection of the female genital tract is not very rare and therefore full performance of the reproductive function may be undertaken by organs already tuberculous. Tuberculosis is especially harmful to the pregnant woman because her blood is already called upon to furnish iron and calcium for the fetus—two substances which she needs in repelling disease. The question of permitting the continuance of a pregnancy in a tubercular individual depends on the age of the patient, her general state of nutrition, her surroundings, what she can do to guard her health, and what may be the possible value of the infant life. If during pregnancy signs of renewed tubercular infection appear, pregnancy must end immediately. In such cases the responsibility of the physician does not end with the termination of the gestation, but the woman must be sterilized at the same time.

This is best accomplished by the method advocated by Sellheim. He opens the abdomen excises and removes the tubes; opens the uterus at the fundus transversely, separates its walls and removes the ovum with the gloved finger. The cervix is then dilated by passing a solid bougie, and a strand of gauze is carried through the cervix into the vagina. The cavity of the uterus is tamponed with gauze and the uterus is closed.

Internal Hydrocephalus. An Experimental, Clinical and Pathological Study. WALTER E. DANDY and KENNETH D. BLACKFAN, Baltimore. *American Journal of Diseases of Children*. December, 1914.

Dandy and Blackfan report a very complete series of careful experiments and observations, and their conclusions are worthy of detailed consideration:

An internal hydrocephalus was experimentally produced in dogs by placing an obstruction in the aqueduct of Sylvius. It is therefore evident that the cerebrospinal fluid is formed in the ventricles faster than it can be absorbed and that the aqueduct is necessary for its escape. An internal hydrocephalus resulted from placing an obstruction in the aqueduct of Sylvius in spite of extirpation of the choroid plexus of both lateral ventricles, though this procedure modifies the grade of the hydrocephalus. An internal hydrocephalus may also result from experimental ligation of the vena magna near its origin; when the ligature is more distally placed or when the sinus rectus alone is ligated, it does not result.

Cerebro-spinal fluid is derived mainly from the choroid plexuses, probably both by filtration and by secretion. An increase of fluid is caused by general venous congestion as demonstrated by temporary jugular compression. Drugs and glandular extracts produce but slight change in the rapidity of formation of the fluid. There is a definite impermeability of the fluid-forming structures. Of the various substances in the blood only traces of a few find their way into the cerebro-spinal fluid. The fluid is more strongly protected from substances in the blood than the peritoneal, pleural or pericardial fluids. There is a rapid and constant formation and absorption of cerebrospinal fluid. A new supply is formed and absorbed at least every four to six hours. The lymphatics play a negligible part in this absorption, as the fluid is absorbed directly into the blood. Absorption is from the entire subarachnoid space. It is a diffuse process and does not take place through specialized structures such as the Pacchionian granulations. There is practically no absorption from the ventricles. The maintenance of an equilibrium between the formation and the absorption of cerebrospinal fluid necessitates a communication between the ventricles and the subarachnoid space, which occurs only through the foramina of Magendie and Luschka. After the introduction of phenolsul-

phoneplitein into the subarachnoid space it soon appears in the lateral ventricles, proving that there are no valves at these openings.

Internal hydrocephalus can be divided into two anatomically different types, depending on the patency or occlusion of communication between the ventricles and subarachnoid space. In seven patients with hydrocephalus, lack of communication was demonstrated clinically. Four cases of hydrocephalus, in which there was communication, were studied. In these cases there was low subarachnoid absorption. The probable cause of hydrocephalus following the excision of a meningocele is the limitation of absorbing surface.

Surgical treatment differs according to the variety of internal hydrocephalus. In the obstructive type the obstruction must be removed. In the communicating type it is necessary to increase the area for the absorption of fluid.

On the Extraction of Needles from Tissues. P. G. SKILLERN, JR., Philadelphia. *Interstate Medical Journal*, March, 1915.

When the x-ray is not available there are several important points to be observed in searching for a needle in the tissues. The field should be absolutely bloodless. This is accomplished by means of a Martin bandage. Local infiltration with novocain-suprarenin should be used, supplemented with nitrous oxide if necessary. The black track formed by the needle in the tissues should be followed, and the tissues should be properly retracted. No time should be lost in searching through the fat, since the needle always passes through this down into the fascia or deeper. Incision should be ample and the dissection should be carried on in planes, i. e., the fascia, then the muscles, etc., down to the bone. When found, care must be taken to make traction only in the long axis of the needle in order to avoid its breaking.

The Injection of a High Percentage of Carbolic Acid in Camphor and Alcohol Solution Against Phlegmons in Joints and Tendon Sheaths. (*Hochprozentige Karbol-Kampfer-Spiritusinjektionen gegen Phlegmonen in Gelenken und Sehenscheiden.*) G. W. SCHIELE, Naumburg, *Zentralblatt für Chirurgie*, March 24, 1915.

The solution Schiele employs is the following: Acidi carbolic liquefacti, 30.0, camphor trit., 50.0; spts. vini, 8.0. After opening the joint or tendon sheath by a small incision, he injects the solution directly into the joint or tendon sheath. He believes he has prevented destructive processes within the joint and has saved affected tendons from necrosis. He has never witnessed poisoning.

Resection of the Posterior Roots for the Cure of Little's Disease. E. M. BLAHD, Cleveland. *The Lancet-Clinic*, March 13, 1915.

The author reports ten cases, of which the first died, but the remainder all recovered. The death he attributes to failure to block off the higher centers by injecting novocaine into the spinal cord immediately above the site of operation. When this procedure is carried out there is no semblance of shock and this probably accounts for the very low mortality. The posterior roots are located by using the ligamentum denticulatum as a guide, that is, resecting only those roots which pass behind the ligament. If this is done there is no danger of cutting through the motor roots.

The author advocates using this operation in all severe cases of Little's disease, as he believes in this way only, may the extreme spasticity be overcome. Prolonged after-treatment is necessary to obtain good results.

The Recognition of Gas Phlegmons by Röntgen Ray. By SCHWARZ, GRAZ. *Wiener Klinische Wochenschrift*, January 28, 1915.

Schwarz shows X-ray pictures in which the diagnosis of gas bacillus infection of the wound was made. The air bubbles are shown as dark spaces in the negatives, resembling somewhat the appearance of Swiss cheese.

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THE INDICATIONS AND CONTRAINDICATIONS FOR THE OPERATIVE AND TRUSS TREATMENTS OF HERNIA.*

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The ultimate results of the modern operative treatment of hernia in experienced hands are so excellent, the dangers of the operation in uncomplicated herniae so negligible that, even at the risk of perpetrating an Hibernianism, I may say that an operation is indicated in every case of hernia, in which there are no contraindications. As will be seen these contraindications are very few; nevertheless they are very important, and therefore merit more than passing consideration.

1. All complicating diseases of sufficient gravity are *co ipso* excluded from operation; this is particularly true of all systemic diseases, for instance, florid syphilis, advanced pulmonary tuberculosis, etc.

2. All acute infectious diseases, particularly all the infectious diseases of infancy, should be looked upon as a temporary contraindication to a radical operation for hernia.

3. Particular attention should be paid to all diseases of the respiratory tract. Individuals afflicted with chronic emphysema, chronic bronchitis, etc., do not stand any operation well; moreover in an operation for hernia the constant coughing, which is a prominent symptom in these patients, puts so much strain upon the integrity of the very important suture line that the possibility of a recurrence is thereby materially increased.

4. Uncompensated valvular lesions should never be subjected to any but the most urgent of operations; as in a majority of the cases of hernia the operation is somewhat in the nature of a prophylactic one there is therefore no reason why they should be subjected to the risks incident to their cardiac affection. If the compensation is good,

however, a radical cure may be undertaken if the hernia is at all irksome to the patient.

5. Diabetes is a contraindication only in individuals who cannot be made sugar-free. While perfect aseptic healing is the rule in all hernia operations, it cannot be denied that slight infections do occasionally occur; such slight infections are, as a rule, of no consequence in individuals in perfect health, and are not of necessity a bar to an ultimately perfect radical cure; but the abnormally high glucose content of the blood of diabetics offers such a splendid culture medium for bacteria that even a slight infection may cause very grave and sometimes even fatal consequences.

6. Affections of the kidneys are contraindications, because individuals so afflicted are not good risks for a general anesthetic. If the nephritis is not very bad and the hernia is very irksome an operation with local anesthesia may be considered. I have repeatedly placed myself on record as being opposed to local anesthesia in the operation for the radical cure of hernia as a routine measure. I believe, however, that a complicating nephritis forms a justifiable exception.

7. Perfect aseptic healing being a most important essential to the radical cure after an operation for hernia it is very important that the integument at the site of the operation be in a healthy condition. I exclude therefore from operation, temporarily at least, all those dermatological conditions which are a bar to an operative asepsis, for instance, acute or chronic eczemata, acne, psoriasis and other scaling conditions, etc.

8. In my experience with the operative treatment of hernia, one of the most frequent post-operative complications has been that of retention of urine, requiring very often the repeated use of a catheter to empty the bladder. As it is always preferable not to introduce any instruments into the bladder, through an infected urethra, I have always refused operation in the presence of an acute urethritis of gonococcal origin.

9. As catheterization may even be impossible in the presence of tight urethral strictures, I prefer in these cases to first dilate the urethra, and only

* Read, by invitation, at a meeting of the Eastern Medical Society, April 9, 1915.

when this has been accomplished do I advise an operation for the hernia.

10. I look upon very early infancy as a contraindication to the radical operation for hernia. In former years I made it the rule to decline to operate for hernia upon children under the age of three years; in recent years my views have been modified, and now I frequently operate upon children below that age. The only danger, especially in the most common form, namely oblique inguinal hernia, is that of an infection of the wound from urine or feces; but as a rule, the urine is sterile in young infants, and I have never seen an infection of the wound, even if, as so frequently happens, the wound is literally bathed in urine. Infection of the wound from feces can be guarded against by appropriate dressings, care and watchfulness. An all important consideration is the social status and surroundings of these little patients. The wealthier classes have the time and can afford the necessary attention that truss treatment entails, at least until the child reaches the selective age. Among the poorer classes no good comes from the truss treatment, and the indications for such treatment are becoming more and more restricted, in favor of earlier operation.

11. Very advanced age must also be looked upon as a contraindication. The term "very advanced age" is, however, a very elastic one; and it should not be forgotten, that some individuals are already old at forty, while others are still young at seventy. I have no hesitancy in stating that the recuperative, and above all, the reparative powers are somewhat below par with advancing years. In addition, individuals of advanced age are particularly prone to the development of post-operative respiratory complications, such as hypostatic pneumonia, which is more than likely to develop when such individuals are confined to bed.

12. As to the hernia itself, the only contraindication that arises is that of extreme size. Herniae that have been neglected occasionally attain such enormous proportions that practically the entire intestinal tract has become prolapsed. It has been aptly said of these herniae, that the contents have lost their right of domicile within the abdomen. Very frequently they are irreducible, but even if reducible, the sudden refilling of the abdominal cavity is apt to cause a dangerous embarrassment of the respiration and circulation. Even in these cases much can be done by carefully carried out reduction cures, in order to reduce the amount of fat within the omentum and mesenteries, and by a gradual replacement of the hernial contents, which

gradually stretches the abdominal cavity, so that it can again accommodate the viscera.

Thus far I have enumerated only the most important contraindications to an operation for the radical cure of a hernia; there are undoubtedly many more. In this connection it is only proper to again call attention to the importance of a careful physical examination, in order to insure against possible surprises.

Important as these contraindications are, they are all absolutely negligible in the presence of strangulation if mild and gentle taxis has failed to reduce the contents. In the presence of such a strangulation there are absolutely no contraindications.

If the contraindications just enumerated are reviewed it will become evident that for practical purposes they may be divided into two main groups; namely those of a temporary nature, and those of a permanent nature. The very term "temporary" is sufficiently explanatory, and requires no further discussion. A most important question, however, arises in the second, or permanent group of contraindications, namely, that of adequate treatment. It is in the presence of these only that recourse should be taken to palliative treatment, so-called.

By the expression, "palliative treatment," I refer to the placing of artificial external barriers in front of the opening, through which the hernial contents escape. These barriers act upon the principle, that a pad of varying size and shape is firmly held against the opening by means of springs or elastic bands. Such appliances are called trusses.

While it cannot be denied, that the wearing of a truss will in some instances be followed by disappearance of the hernia, or better said, by a failure of a reappearance of the hernia, I have no hesitancy in stating, that a radical cure, in the accepted surgical sense, is of such an exceptional rarity as not to merit serious consideration. If the pathology and pathogenesis of hernia is considered, it is self-evident that no radical cure of hernia is possible, unless the hernial sac is either extirpated or obliterated. It can, of course, be conceived that the pressure of a truss may cause so much trauma to the endothelial lining of the peritoneal sac, as to cause agglutination of its walls; but to expect a truss to do so, just at that anatomical location, which we call the internal ring, is, to my mind, expecting rather much from inanimate objects. So-called cures can be accounted for in one of two ways. Assuming, for instance, that a truss is applied for a number of years, to a congenital inguinal hernia in a child, and is then discarded, such a patient may be cured, because the normal oblit-

eration of the processus vaginalis has been completed; or the cure may be only an apparent one. After the lapse of years, the presumably cured hernia reappears, and at operation it is found that the hernia is still of the congenital variety.

A description of the various kinds of trusses, the advantages of one over another, their method of manufacture, etc., is not within the scope of my discussion. It is quite within my sphere, however, to call attention to certain fundamental principles in the use of trusses, to their drawbacks and to their limitations.

When a decision is reached that a given case is suitable for treatment by a truss it is not sufficient to send the patient to an instrument or truss maker, or worse still, to the corner druggist, with an order to buy a truss. Full directions must be given as to the variety of the hernia, whether direct or indirect, inguinal, or femoral. All of us have seen inguinal trusses worn over femoral herniae, and vice-versa.

It should be the physician's duty to assure himself that the truss retains the hernia, not only when the patient is standing quietly, but also that it does not shift on sitting or lying down, in rapid walking, or in walking up or down stairs. It should be his duty furthermore to see to it that the pressure of the pad is applied over that point of the hernial roadstead where it is most likely to exert its influence in the proper retention of the hernial contents. Every hernia escapes from the abdomen at an internal ring, so-called, and maximum pressure should be applied at this ring.

It is the aim of most dealers in trusses to fit the patient not only to a truss, but to the particular truss which they happen to be interested in. The important point appears to be to make a sale. Whether the truss fits the individual or not, whether the truss retains the hernia or not, whether the spring is too weak or too strong, is entirely of secondary consideration; and yet all these factors are not only conducive to the comfort of the patient, but fall fully within the domain of the physician supervising the health of his patient.

A *sine qua non*, and yet a rule as frequently observed in its breach as in its observance, is that the hernial contents be not only completely reduced prior to the application of the truss, but be at least completely reducible. If retention of the hernial contents is impossible, the application of a truss is absolutely contraindicated, not only because it is useless, but also because it may do considerable harm. A truss in such instances may be the source of considerable pain, and may give rise to saccular

adhesions, with their attendant dangers. Despite this contraindication I have seen this rule violated very frequently.

I have purposely refrained from discussing at great length the discomforts of wearing a truss; that these are actual is amply proven by the fact that patients frequently seek operation only with the view to be rid of them.

I am absolutely convinced of the fact that the modern operation for the cure of an uncomplicated hernia in experienced hands and in a modern hospital is practically devoid of danger, also that, similarly carried out, the final results are so excellent, that it may be stated without danger of contradiction, that the operation is in reality a blessing to the many individuals afflicted with hernia. However, I do not urge operation in every case that comes to my observation. For my own purposes, I have planned the following routine, when a patient with a hernia presents himself to me for examination.

1. A complete history is taken, particular stress being laid upon the complaints of the patient; in other words, whether or not the hernia causes any symptoms or physical complaints, in addition to the mere presence of a hernial protrusion.

2. An exact anatomical diagnosis of the variety of the hernia is made, i.e.; whether direct or indirect, inguinal, femoral, etc.; as to the reducibility of the contents, their probable nature, the presence or absence of bladder symptoms, the presence or absence of an undescended testis, etc.

3. A thorough physical examination is made, particularly as regards the condition of the heart, lungs and kidneys, in order to find any contraindications.

4. No contraindication to operation being found, either in the general or local condition, an operation is advised. The dangers of the operation are not minimized, but truthfully explained; also the chances of a radical cure. At this stage the patient usually inquires as to the possibility of obtaining relief from wearing a truss. I have made it a rule not to advise against the use of a truss except in those cases in which there is an absolute contraindication to their use, for instance in irreducible herniae, or in the presence of an undescended testis, or in the presence of such herniae in which physical examination leads me to believe that there will be insurmountable difficulties in the retention of the hernial contents. However, I never fail to impress upon the patient, that I do not look upon truss treatment, in any sense of the word, as curative. The patient ultimately is made to fully understand

the *pros* and *cons*, and it is he who should finally seek operation, and not the surgeon who should seek to operate.

ACUTE GONORRHEAL EPIDIDYMITIS AND ITS TREATMENT.*

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ETIOLOGY.

Gonorrheal epididymitis is always an extension of a posterior gonorrheal urethritis. It has been variously assumed that this extension takes place,

1. Through the blood stream.
2. Through the lymphatics.
3. By direct extension of inflammation along the vas.
4. By gonorrheal toxins.

The objection to the theory of extension through the blood stream is the fact that there is a great discrepancy between the number of epididymitides and involvements of other parts of the body. Why should the testicle be immune if the extension were through the blood stream?

The lymphatics may be excluded as a factor in the extension because, (a) the lymphatic current runs in the direction opposite to the spread of infection; (b) it has been shown histologically by Nobl that the epithelial lining is the only portion of the vas which is involved in cases of epididymitis; the lymphatics surrounding the vas show no involvement.

The extension of gonorrheal inflammation in the urethra is very slow. It takes over two weeks to reach the posterior urethra from the meatus. How can we explain the rapid and sudden outset of an epididymitis on the assumption that the extension is by contiguity along the lining of the vas? On the contrary, it is a well known fact that the vas is never involved before the epididymis, though sometimes secondarily.

The toxic origin of gonorrheal epididymitis is untenable because gonococci have been repeatedly demonstrated in the epididymis.

In a very scientific and convincing paper, Oppenheim and Loew have pointed out the modus of infection. They showed in animals and human beings that an antiperistaltic movement of the vas follows stimulation of the hypogastric nerve.

By antiperistaltic movement is meant a peristalsis

from the urethra to the epididymis, i.e., in the direction opposite to that normally taken by the spermatozoa. The hypogastric nerve can be reflexly stimulated by irritation of the colliculus as in instrumentation, prostatic massage, coitus, forced bodily movements and emissions. As a result of this antiperistalsis, gonococci are carried from the posterior urethra through the vas to the epididymis. The first portion of the epididymis to become involved is invariably the tail, and it is here that the antiperistaltic wave is interrupted by angulation of the tubule. Oppenheim and Loew also proved that direct galvanic stimulation of the colliculus resulted reflexly in antiperistalsis of the vas. When cocci were placed in the posterior urethra of rabbits and the colliculus galvanically stimulated, epididymitis, in which these cocci were demonstrated, was produced.

* PATHOLOGY.

In acute inflammations of the epididymis, all of its coats are usually involved. The picture varies with the intensity of the inflammatory process from cases in which the epithelium lining the tubules alone is involved to cases in which there is abscess formation in the paracanalicular connective tissue.

The changes are always most marked in the tail. In the very mild cases, there is proliferation and degeneration of the epithelial lining of the tubules, round-celled infiltration of the membrana propria and muscular walls of the tubules, and some round-celled infiltration and serous exudation into the surrounding connective tissue. There is some dilatation of the capillaries with round-celled infiltration of their walls.

In the very severe cases there is marked desquamation of the epithelial lining of the tubules, with obliteration of the lumen in many places, due to pressure of the surrounding swollen connective tissue. In places the tubules are very markedly dilated and their lining may be completely destroyed, so that their contents are directly continuous with the inflammatory material in the surrounding connective tissue.

The blood-vessels show marked engorgement. The most striking changes are seen in the connective tissue. There is extensive round-celled infiltration with breaking down of tissue in many places, resulting in abscess formation. In these abscesses gonococci have been demonstrated. Cunningham found gross pus in varying amounts in sixty-seven per cent. of his cases of epididymitis. Mond and Terillon, in experiments confirmed by Hagner, proved that the characteristic shape of the swelling in epididymitis is due to the infiltration of the connective tis-

* Read at a meeting of the Genito-Urinary Section, New York Academy of Medicine, March 17, 1915.

sue between the tubules. They injected gentian violet into this intertubular connective tissue in cadavers and reproduced the typically shaped swelling. Similar changes to those found in the tail occurred to a lesser extent in the body and head. Sometimes they are absent here altogether.

The vas is the only portion of the cord which is involved. The changes here are confined almost entirely to the epithelial lining and are most marked nearest the epididymis.

In the severe cases there is usually an involvement of the tunica vaginalis, which results in hydrocele, and associated with this there is often an edema involving the skin of the scrotum. The scar resulting from this inflammation may result in permanent obliteration of some of the tubules of the epididymis with a resultant sterility. Buxla found no children in 41.7 per cent. of bilateral epididymitides in the German Army. Liegeois, in twenty-eight cases of double epididymitis, found absence of spermatozoa in twenty-one.

METHODS OF TREATMENT.

These can be divided into expectant and operative. Until the last few years, the treatment was entirely expectant, and consisted of rest in bed, hot or cold applications, support, and topical applications such as guaiacol, ichthyol, etc. With these methods patients were usually confined to bed from one to six weeks. Electricity has been used with satisfactory results. Schindler tried Bier's hyperemia, and finding it unsatisfactory, employed puncture with a needle. He claims good results whether pus is present or not. Repeated punctures at one sitting were found to give the best results. He claims that by this method pain is more rapidly relieved and the temperature drops sooner to normal. This improvement he attributes to the relief of congestion by bleeding and diminution of tension by opening the capsule. This method must be rather painful (he uses a fairly large needle) and can not surely cause a return to normal. Fruehwald does not agree with Schindler, being of the opinion that the relief of pain and fever from puncture are only temporary.

Baermann introduced a needle along the entire length of the epididymis, aspirating during withdrawal. By this method he was able to find more than one pus focus. Schindler and Bruck advise the administration of atropin for the purpose of paralyzing the muscular coat of the vas, thus preventing antiperistalsis. They claim in this way to have diminished the number of epididymitides complicating their cases of gonorrhea. Leschner has used antigonococcus serum but the results are not encouraging.

Hagner makes a free incision, six to ten centimeters long, under general anesthesia at the junction of the swollen epididymis with the testis, through the scrotum and tunica vaginalis. The fluid in the tunica is evacuated and the swollen epididymis is delivered. Multiple punctures are made with a tenotome. If pus is found, the punctures are enlarged and washed with a 1 to 1,000 solution of bichloride of mercury and saline solution. A cigarette drain is inserted and the wound is sutured. The wounds heal in a week. All cases but one were out of bed and free of pain in seven days. One of Hagner's cases recurred. One bilateral case in which a double epididymotomy was done was followed by azoospermia. Bromberg reports an epididymotomy in which there was so violent an infection as to necessitate removal of the testis.

The disadvantages of Hagner's method of treatment are the necessity for general anesthesia, the confinement to bed for one week and the fact that there is no return to the normal. Paul Asch employed injections of silver nitrate of 2 to 5 per cent. into the epididymis, with a small needle, and later used protargol in 10 per cent. solution. This shortened the duration of the epididymitis and left a smaller infiltrate, but the method was very painful. Following Harmonics he then employed electrargol injections. He claimed that while there was an immediate increase in the pain, this was greatly diminished in twelve to twenty-four hours. In early cases one injection generally sufficed, but in more advanced cases, repeated injections were necessary, in some cases as many as five. Patients were able to return to work after three days even in severe cases. One case lasted eight days. In a trial of this method I found that in spite of the greatest refinement of technic, such as warming the solution, using a very fine needle, injecting very slowly, and distributing the fluid evenly throughout the epididymis, the pain was unbearable. However, the subjective symptoms and fever rapidly improved after twelve to twenty-four hours, but the infiltration invariably remained. I then substituted saline for the electrargol, with identical results. This naturally suggested the use of novocain. Injections of novocain were used in sixty cases in the following manner: The scrotum over the epididymis was painted with tincture of iodine. Two to six cubic centimeters of a sterile two per cent. novocain solution were injected directly into the inflamed epididymis with an ordinary hypodermic syringe, through a very fine needle. The fluid was evenly distributed throughout the inflamed area, the needle being inserted through the

skin but once, yet withdrawn from the epididymis to be reinserted at different points and at different angles. If the tail only was involved, the injection was limited to this area. At first two cubic centimeters were used. It was occasionally found necessary to repeat the injection one or two days later. I came to the conclusion that the entire inflamed area had not been covered, and therefore I used up to six cubic centimeters. Thereafter one injection usually sufficed. In five or six cases two injections were used, but never more. There was a slight momentary pain due to steadying the epididymis with the hand and to the introduction of the needle. As soon as the fluid entered the epididymis the pain ceased. After three-quarters of an hour there was a slight sensation of weight and pressure and, rarely, slight or moderate pain. This disappeared entirely in the course of a few hours. The patients were generally able to return to work at once. No other treatment was employed except for the wearing of a suspensory.

The temperature returned to normal within twenty-four to forty-eight hours. The feeling of malaise disappeared immediately after the injection and recurred to a slight extent for a short time some hours thereafter. In those early cases in which the tail only was involved, we obtained the best results. The swelling generally did not extend to the body and a minimum of scarring was left. The swelling disappeared very gradually. In two or three weeks it had returned almost to normal. In the more advanced cases, in which the entire epididymis was involved, the subjective improvement was equally good but the resultant scar persisted longer (four to five weeks) and remained larger. In two such cases in which edema of the skin was already present, hydrocele occurred subsequently without subjective symptoms. In one case of double epididymitis treated in this way azoospermia resulted. The treatment of the urethral gonorrheal was uninterrupted during this time.

Outlines of a few typical cases follow:

CASE I. J. D., No. 432, age 22 years. Acute gonorrhea began November 10, 1911. On November 29th, pain and swelling of right epididymis. December 1st, injection of 2 cubic centimeters of electrargol into head and 2 cubic centimeters into tail of epididymis. The pain of injection was very severe and lasted three-quarters of an hour, followed by slight pain, less severe than before injection. All pain disappeared except in the inguinal region the morning after, and patient went to work.

December 4th: Epididymis not tender, smaller, less hard; cord somewhat tender, still much enlarged.

December 16th: Again slight pain in cord and

epididymis; injection of 1 cubic centimeter of electrargol into head and 1 cubic centimeter into tail. Followed by pain as before and next morning subsidence of all subjective symptoms. Scar in epididymis, small and hard, persisted.

CASE II. S. J., No. 211, age 26 years. Gonorrhea eight years ago.

April 21, 1913: History of painful swelling in left epididymis for eleven days. Examination of secretion at meatus showed much mucus, few pus cells and urethral epithelium, but was free of bacteria. Prostatic secretion showed few pus cells and no bacteria. Entire left epididymis very large, hard and exquisitely tender. Injected 5 cubic centimeters warm sterile water into epididymis. Followed by severe pain lasting thirty minutes after which patient had slight pain for two hours and none since, but feeling of weight persisted some days.

April 25th: Epididymis very large, hard and not tender.

January 16, 1914: No symptoms since above data. Epididymis feels normal except for slight thickening of tail.

CASE III. D. L., No. 394, aged 27 years. Acquired gonorrhea October 6, 1913. Developed left sided epididymitis.

October 24th: Injected 2 cubic centimeters of one per cent. cocain.

October 27th: Patient states that pain was immediately relieved after injection, but recurred about one hour later and lasted for six hours; no pain since. Tail is found enlarged, but not tender.

November 7th: Has had pain and swelling of right epididymis for two days; 4 cubic centimeters of one per cent. cocain injected.

November 11th: One-half hour after injection pain in groin, very severe and lasting only three hours. Two days later slight pain in groin, but entirely free of pain again in twenty-four hours. Following a hot bath, November 10th, 11 p. m., pain recurred. Injection of 6 cubic centimeters of one per cent. cocain into head and tail.

November 12th: Above injection relieved patient of all pain for fifteen minutes. Pain recurred for twelve hours; since then entirely free. Epididymis enlarged, hard, very slightly tender.

December 3, 1913: Both epididymes show nodules on lower poles which are not tender. Spermatic fluid shows no spermatozoa.

CASE IV. J. F., age 22 years. Acquired gonorrhea October 12, 1913. Gonococci were demonstrated in the prostatic secretion November 17, 1913. Came for treatment very regularly.

November 26th: Patient states that he had pain in right scrotal region one week ago with swelling lasting one day. Two days ago pain and swelling, growing worse to date. Entire epididymis much enlarged and exquisitely tender. Fainted in subway while coming to office. Injected 8 cubic centimeters of one-half per cent. novocain.

November 27th: Reports that he had no pain for three-quarters of an hour after injection, then felt chilly for a short time, and pain recurred

slightly. Went to bed and slept well, awakening next morning without pain and with only slight tenderness. Has been at work daily without inconvenience.

December 1st: Lower pole moderately hard, smaller, not tender, upper pole not tender.

December 3rd: Epididymis not tender, growing smaller.

December 10th: Epididymis normal but for small nodule which is not tender.

CASE V: N. S., aged 23 years, car conductor. Acquired gonorrhea December 12, 1914. Gonococci found in prostatic secretion December 25, 1914.

January 4, 1915: Entire half of scrotum and contents markedly enlarged, skin edematous, and epididymis exquisitely tender. Vas enlarged and tender. Can hardly walk. Temperature at 3 p. m. 102.8° F. Injection of 6 cubic centimeters of one per cent. novocain.

January 5th: Temperature 100.8° F. Epididymis large, hard, not tender; cord slightly tender; is working.

January 6th: Walks without pain; has been working steadily; epididymis not tender, swelling as before. Temperature 3 p. m. 98.8° F.

January 13th: Epididymis smaller, softer, not tender; no pain; has not lost a day's work, suffered no inconvenience since injection.

February 1st: Small scar in epididymis, not tender or painful.

CASE VI: G. P., No. 447, age 35 years. Acquired gonorrhea November 12, 1914. Had prostatic abscess. Gonococci demonstrated in pus from abscess. Left epididymitis December 9th; injected 4 cubic centimeters one per cent. novocain into tail and body.

December 14th: States that pain ceased immediately after injection; recurred slightly for some hours and then disappeared completely. Epididymis large, very slightly tender.

December 21st: Epididymis is smaller, not painful, very slightly tender.

February 5th: Left epididymis contains nodule which is not hard but elastic and is neither painful nor tender.

CASE VII: R. W., No. 482, aged 45 years, laborer. Acquired gonorrhea November 21, 1914. Epididymitis right side, January 11, 1915. Injection of 6 cubic centimeters of one per cent. novocain into entire epididymis. Pain disappeared entirely for one-half hour and then recurred to lesser degree for some hours. Skin over scrotum and over inguinal canal edematous.

January 29th: Hydrocele developing on right side, no pain or tenderness.

Conclusions: In comparison with previously described methods of treatment of epididymitis, it is evident that the above described method possesses the following advantages:

First. Patients are not confined to bed and can carry on their regular occupations.

Second. The treatment is painless.

Third. It can be done in ambulant fashion.

Fourth. It causes the temperature to drop at once to normal.

Fifth. Incision under narcosis with attendant dangers are obviated.

Sixth. Cases injected early with the tail alone involved are aborted (no spreading to body or head).

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COMPRESSION FRACTURE OF THE UPPER EXTREMITY OF THE TIBIA.

The mechanism of compression fracture as given by Wagner is essentially as follows: The patient falls striking on the feet with the knees in extension and the force of gravity, acting through the femur on the tibia, drives the inferior surface of the internal condyle of the femur against the superior surface of the inner tuberosity of the tibia, the force of the impact breaking the tuberosity from the tibia. In the same manner, in patients having a moderate amount of genu valgum, or where the force of the impact acts obliquely tending to abduct the leg at the knee joint, the force acts through the external condyle of the femur and a fracture of the outer tuberosity of the tibia is the result.—A. C. BURNHAM in the *Medical Record*.

THE APPLICATION OF MODERN UROLOGICAL METHODS IN THE DIAGNOSIS OF SURGICAL CONDITIONS OF THE URINARY TRACT.*

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In the examination of patients admitted to the urological service of Mount Sinai Hospital, we have endeavored to follow a certain routine procedure. It is advisable to carry out the different steps of the examination in their proper sequence. By so doing considerable time is saved, and unnecessary re-examination will often be avoided. For example, it would be unwise to cystoscope a patient before resorting to roentgenography; for, should the latter demand a pyelogram or a ureterogram for confirmation, it would entail a second cystoscopic examination; cystoscopy, ureteral catheterization and uretero-pyelography could all have been combined at one sitting.

The following has been the most satisfactory order of the different steps in the examination: 1. History. 2. Physical examination. 3. Urinalysis. 4. Roentgenography. 5. Instrumental examination, including cystoscopy, urethroscopy and ureteropyelography. This routine applies mainly to renal and ureteral cases; in prostatic, urethral and bladder conditions, urethral catheterization and instrumentation are in order before resorting to roentgenography. It will of course be unnecessary or impossible in every case to follow out all these steps. Frequently, however, it will be found necessary to resort to all the means at our disposal before a definite diagnosis can be made.

I shall have but little to say concerning the history and physical examination. Everyone realizes their importance and the valuable data occasionally obtained. However, it is especially in urological cases that both may be misleading or valueless, and we have to depend upon the special examinations for more definite and accurate information. I shall therefore here illustrate the more specific procedures employed in urological diagnosis.

Urinalysis: This part of the examination is carried out as follows: At first a single specimen of urine is examined in the routine way. In females the specimen should be obtained by catheterization.

A twenty-four hour specimen is then collected with the patient on ordinary full diet (unless otherwise contraindicated), and examined quantitatively

for urea. When greater accuracy in the determination of urea is desirable a second twenty-four specimen is collected, the patient having been placed on ordinary full diet, with the addition of meat and six eggs a day.

Roentgenography is part of the routine examination of every patient in whom there is a suspicion of urological condition. Such a routine examination often discloses very unexpected findings.

Cystoscopy, ureteral catheterization and pyelography will be taken up in their proper sequence.

I intend now to discuss in detail a few of the more common diseases of the urinary tract with a description of the methods of diagnosis employed, and shall first take up the subject of urinary lithiasis, under the headings of renal, ureteral and vesical calculus.

Renal calculus: The information obtained by a careful history, physical and urinary examination may be of an entirely negative character, and still serious disease be present. It is as yet not generally recognized that stones may remain latent in the kidney for a long time, reaching a large size, and even destroying the parenchyma without producing focalizing symptoms. According to Cabot¹ pain is absent in about 10 per cent. of the cases of renal calculus, renal colic is present in about 50 per cent., and pain without colic in 30 per cent. In connection with the subject of pain, it is important to recognize the fact that occasionally the pain may be referred to the opposite side. Frequency of micturition is present in a large number of the cases, but its absence is of no diagnostic value.

Urinalysis gives valuable data in many of the cases, but it must be borne in mind that stones may be present with only microscopic changes in the character of the urine. Albumen, pus and blood are present in over 80 per cent. of the cases. Stones may exist without the presence of red blood cells in the urine. It will thus be seen from this cursory review that unless more specific means for diagnosis are adopted many cases of renal calculus will be overlooked or mistaken for other conditions, and consequently many patients subjected to needless operations. Failure to take proper cognizance of these facts will still lead many to treat renal calculus for lumbago, sciatica, cholecystitis, appendicitis and other conditions.

Roentgenography, cystoscopy and ureteral catheterization and pyelography are indispensable diagnostic agents in the examination for renal calculus. Of the three roentgenography is the most valuable procedure.

The roentgen-rays will demonstrate the presence of renal calculus in probably 98 per cent. of the

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cases. The stones likely to be overlooked are of the pure uric acid variety, a rare form. Thomson Walker² has recently stated,¹ "that in an aseptic case the absence of a stone shadow after two or more examinations when a plate of the first quality has been obtained excludes all but a pure uric acid calculus. When the urine is alkaline the absence of a stone shadow excludes a calculus of any composition, for it is certain that phosphates will have been deposited upon a uric acid calculus and render it opaque to the roentgen-ray." Every roentgenographic examination of the urinary tract should include both ureters, kidneys and the bladder, for occasionally the pain is referred to the opposite kidney, or bilateral calculi may be present, with symptoms on only one side. In order to determine whether a plate is of good quality, it is essential that besides the bony structures it should demonstrate the kidney shadows and the outlines of the psoas muscles. It is not alone sufficient to make a diagnosis of renal calculus; an endeavor should be made to determine definitely the position, size and number of the stones. Such data, needless to say, are of inestimable value to the surgeon. In the majority of cases he should be able to decide from a careful study of the roentgen-ray plates whether it is feasible to remove the calculus through an incision into the renal pelvis (pyelotomy), or through the renal substance (nephrotomy).

From the density of the shadow thrown by the stone it will often be possible to obtain an idea of its chemical composition. Calcium oxalate calculi generally cast the densest shadow, then come the cystin stones, which are very rare, and the next the phosphate of lime stones.

In order to more accurately localize the position of shadows, Fenwick³ has divided the loin space into an inner and outer division by a line running vertically upwards from the center of the crest of the ilium to the ribs. This line is known as the midvertical and Fenwick formulates the following statements:

"A. Shadows outside the midvertical are usually cast by contents in the bowel.

"B. Shadows inside the midvertical line are usually urinary shadows, or rarely cretaceous gland shadows.

"C. Shadows arranged along the midvertical or near it are not infrequently collections of stones in the cortical portion of the kidney.

"Even making allowance for abnormal position and for extreme downward displacement of the kidney, the shadows of stones in the kidney will still fall (if the lamp be mesial) within or on the midvertical."

A small oval or heart-shaped shadow on a level with and close to the transverse processes is of the first and second lumbar vertebrae is generally due to a stone located at the uretero-pelvic junction. The position of the shadow will vary however, if the kidney is ptosed.

At times, however, notwithstanding careful study of the roentgen-ray findings, errors will be made in their interpretations, and extrarenal shadows will be diagnosticated as intrarenal. These mimetic shadows in the renal region may be due to intestinal concretions, calcified lymph glands in the mesenteric group or gall stones. A very dense, sharply-outlined shadow, especially if it be somewhat irregular should arouse suspicion as to its intrarenal position (even if the negative shows it to be within the kidney shadow) and demand corroboration. Within the past year we have had under observation three such cases; all showed distinct shadows in the renal region, and were associated with pronounced renal symptoms, including colic in one case, pain hematuria, and pyuria in another. So typical were the findings considered that no further evidence was thought necessary. At operation no stones were found; in two of the cases the shadows were discovered to be due to lumbar glands, and the urinary condition was the result of a colon bacillus infection. In order to avoid such errors, and to assist in identifying extra- from intrarenal shadows, and as an aid in their localization, pyelography will be found of considerable value.

Used with discretion pyelography may be considered a safe procedure. The technic we employ is as follows: The ureter on the suspected side is catheterized to the pelvis. It is advisable to use a catheter that does not occlude the ureteral lumen, in order to allow a return flow. Before injecting allow all the urine in the pelvis to drain out, this will avoid injecting a distended pelvis and so producing dangerous pressure. We employ either argyrol 40 per cent. or collargol 15 per cent., and inject with a 10 c.c. Record syringe after the roentgen-ray plate and apparatus have been properly adjusted for taking the exposure. The syringe can be accurately gauged, and more easily controlled than by the gravity method. There is no danger of causing injury if the pelvis is not overdistended. For this reason it is often advisable to determine the capacity of the pelvis by filling it with methylene blue, after which the silver substance may be injected with a greater degree of safety. It is seldom necessary to inject more than 5-6 c.c., and should the patient complain of pain before this, the injection should be stopped. By following this technic we have had no unpleasant effects.

The data that will aid us in determining the localization of the suspicious shadow will depend upon its distance from that of the renal pelvis as well as the relation it bears to the pelvic outline. Distortions in the pelvic outline are also of diagnostic value; they are due to inflammatory process caused by the stone, or result from back pressure from obstruction. However, too much stress must not be laid upon abnormalities in the pelvic outline, for renal infection producing distortion of the pelvis and calices may exist in the absence of stone. Comparison should be made in all cases between the shadow in the original plate and the pyelogram.

If the stone is in the pelvis of the kidney its shadow will be either diminished or obliterated by collargol. The pelvis and calices, however, will often show some changes in outline, either irregularity or dilatation. A calculus situated in a calyx may be localized there when its shadow can be distinguished through the outline of the calyx, or when there is marked irregularity or dilatation of the calyx corresponding to the position of the stone in the original plate.

Stones in the cortex may be diagnosed with a fair degree of accuracy. The shadows are generally situated, according to Braasch,⁴ at or near the end of a calyx, rarely at its side, or they may overlap the calyx shadow. A shadow at a distance of 3 to 4 inches from the pelvic outline, unless in a greatly enlarged kidney, may be considered extrarenal.

Gall stones may closely simulate renal stone in symptomatology; they may occasionally cast shadows in the roentgenogram that resemble very much those of renal calculi in outline and position. Under these circumstances differentiation can be made by pyelography alone. Gall stone shadows show a dense periphery, and faint center and are usually circular in outline. A solitary gall stone shadow is uncommon. Should any doubt exist in the interpretation, a pyelogram will demonstrate that the shadows are of gall stones by their distance from that of the renal pelvis.

The data obtained by cystoscopy and ureteral catheterization vary considerably in their value. The bladder picture is often normal, and the slight changes that are encountered occasionally at the ureteral orifices cannot be considered characteristic. It is important to catheterize both ureters for the condition of the presumably normal kidney should always be ascertained before subjecting the patient to operation. To indicate the basic importance of this procedure it need only be stated that a complication may arise during the course of an

operation for stone which may necessitate removal of the organ. The urines obtained by catheterization should be collected in sterile tubes and subjected to chemical, microscopical and bacteriological examination. The urine last obtained before removal of the catheters should be used for bacteriological tests. The importance of cultural examinations of the catheterized urines as a guide in determining the method of operative procedure has not been sufficiently emphasized. Beer⁵ has called attention to this fact in a recent paper. With a sterile urine it may be considered safe to suture a nephrotomized kidney without drainage; an infected urine renders such an ideal procedure unsafe. Many kidneys have been sacrificed after nephrotomy because the significance of bacteria in the urine has not been appreciated.

The determination of the urea output of the segregated urines is of value; a normal urea volume on one side, with a considerably diminished excretion on the other side should be considered valuable corroborative evidence. For testing the functional capacity of the kidneys we rely almost exclusively on indigo carmine, taking into consideration the time of appearance, and the intensity of the color. The diseased side will generally show a diminished functional activity. The degree of this diminution will depend to a certain extent upon the destruction resulting from the calculus. The renal reflex, however, plays such an important rôle, that frequently it will be found that the diminution in the excretion of the dye will be considerably greater than can be accounted for by renal destruction. In aseptic cases with small stones, the changes may be so slight that there will be no appreciable secretory disturbance. In general, therefore, it may be said that the functional tests are not of great diagnostic value in renal calculus.

The question of the diagnosis of the small percentage of calculi which cannot be demonstrated roentgenographically is still unsettled. Kümmel⁶ has recently proposed a method by means of which these uric acid calculi may at times be made visible. This consists in injecting an opaque silver salt into the renal pelvis, and subjecting the patient to another roentgen-ray examination the following day, after all the silver has been drained off. The theory is that the stone will become coated with silver, and thus be rendered visible. We have employed this method in a number of cases in which a calculus was suspected, and was not seen in the roentgenogram, but have not been able to verify the diagnosis thereby.

Ureteral calculus: In general it may be said that the diagnosis of this condition is more difficult than

that of renal calculus. The reason is, in part, the less clean-cut symptomatology, and the greater possibility of error in the interpretation of the findings of the special examinations. As a result very many ureteral calculi are overlooked. The condition most often confused with ureteral stone is appendicitis; when the latter is associated with hematuria the possibilities of error are considerable, unless all the special examinations are employed.

The remarks made upon urinalysis in cases of renal calculus apply with equal force in the diagnosis of ureteral stone. One point I wish to emphasize again, viz.: The absence of red blood cells, even in centrifugalized urine, does not prove the absence of ureteral calculus. Upon a number of occasions we have observed that even large stones may be imbedded in the ureter without producing microscopical bleeding.

Roentgenography in ureteral calculus offers more difficulties in interpretation than roentgenography in renal stone. A negative roentgenogram cannot exclude ureteral calculus with any of the certainty that we have seen applies to renal stone. Calculi in the lower ureter are especially apt to be overlooked in the roentgenogram; some observers believe that as large a proportion as 10 per cent. of stones in the ureter do not show roentgenographically. The difficulties are increased by the likelihood of misinterpreting the numerous extra-ureteral shadows that may appear along the course of the lower ureter. The correct interpretation of these shadows requires considerable experience, and very often it is impossible to make a positive diagnosis unless additional corroborative evidence is obtained. These shadows along the path of the ureter may be cast by phleboliths (calcareous infiltration of a thrombus), calcified lymph glands, or concretions in the appendix or intestine. Ureter calculi present certain characteristics in the roentgenogram; they are most frequently oval or elongated, the long axis of the shadow being directed downwards towards the bladder. When cystoscopy and the other methods to be described cannot be carried out, the diagnosis may at times be made by taking roentgenographs at intervals of several weeks, for it is well known that calculi are often passed spontaneously. The demonstration of the same shadow at different levels is conclusive proof of its intra-ureteral situation. Round shadows are always suspicious of phleboliths. The latter are generally multiple, and are most often grouped about the shadow of the ischial spine; calcareous glands also generally cast multiple shadows, arranged in irregular groups along the spinal col-

umn, or at the brim of the true pelvis. Nevertheless it is not possible to formulate definite rules for the interpretation of these extra-ureteral shadows; a more specific method must be resorted to, and this we have at our command in the procedures to be described.

Cystoscopy and ureteral catheterization are therefore indispensable in the examination for ureteral stone. Here they are of greater value than in the diagnosis of renal calculus; indeed, the diagnosis can often be made from the cystoscopic examination alone. Meatoscopy, or the study of the ureteral orifices, is at times of considerable value. The calculus may be seen protruding from the meatus, or its tip may be visible. A stone imbedded in the lower ureter generally produces congestion, edema or prolapse of the mucous membrane of the ureteral orifice, changes that at times may simulate those seen in renal tuberculosis. Chromoureteroscopy, or the study of the ureteral orifices after the injection of indigo carmine, gives additional corroborative data. In complete obstruction, indigo carmine will not be seen coming from the diseased side, while on the normal side, a distinct blue jet is observed. If the stone partially blocks the ureter, a thin, weak, bluish stream, or just a mere trickle of faintly blue-tinged urine will be seen issuing from the ureter; a marked contrast to the picture observed on the normal side. In examining for stone it is of value to know that there are points of predilection for the obstruction of ureteral calculi. These are the uretero-pelvic junction; at the brim of the bony pelvis where the ureter crosses the iliac vessels, a distance of about 10 cm. from the ureteral orifice; and the intramural portion of the ureter, where the greater majority of stones are obstructed. The ureteral catheter will encounter distinct obstruction in about 75 per cent. of all ureteral stones. In most of the cases the obstruction may be overcome. Indeed it is often surprising to discover a catheter pass by a large stone that apparently blocked the ureter. Obstruction to the catheter, however, does not mean stone or stricture. In about 25 per cent. of the cases obstruction from physiological or anatomical peculiarities is encountered low down in the ureter. Obstruction higher up is of more significance, and is generally of a pathological nature. The average distance a ureteral catheter can be introduced is about 35 cm.; if no more than 27 cm. can be inserted, an obstruction is probably present. The passage of a catheter beyond the calculus is often followed by a profuse flow of highly colored, clear, or cloudy urine, thus undoubtedly demonstrating intra-ure-

teral obstruction, with damming back of urine in the ureter and pelvis.

By means of the wax tipped catheter, suggested by Kelly, it may be possible to demonstrate that the obstruction is due to stone, but extreme care must be taken to avoid scratching the wax with the cystoscope. By means of the catheter we may determine the extent of a hydronephrosis caused by the calculus, by injecting a colored solution and measuring the amount before it appears alongside of the catheter, or produces pain in the kidney. By this distention test it can also be determined whether the colic produced by it is of the same nature as that causing the symptoms. The urines obtained by ureteral catheterization will give important information only when damage has been done to the kidney by the back pressure in the ureter and pelvis. The urea excretion is lower on the diseased side as a rule. The chemical tests (either indigo-carmin or phenolsulphonaphthalein) will demonstrate diminished renal function only when destruction of renal tissue, pelvic dilatation or infection has taken place. However, when the calculi are small and do not produce obstructive symptoms, there will be no diminution in functional activity; and since the difficulties in the diagnosis of ureteral calculus are found in the small stones casting a doubtful shadow, it is evident that these tests are of diagnostic value in but a limited proportion of the cases.

A certain proportion of obscure cases will require still more corroborative data to establish a definite diagnosis. They are those in which there is no shadow in the roentgen-ray picture, but an obstruction to the ureter catheter is present, and the urinary findings are suspicious of calculus; or those in which the roentgenogram suggests a ureteral calculus, but the catheter does not encounter an obstruction and the urinary findings are negative. The methods in use to determine whether a shadow is intra- or extra-ureteral are as follows: Stereoscopy, the shadowgraph catheter and ureterography. Stereoscopy requires considerable experience on the part of the roentgenographer, necessitates special apparatus, and is not as reliable as the other methods; it is of more value when combined with the use of the shadowgraph catheter. The shadowgraph catheter is at times misleading, for it may be obstructed at a point opposite the shadow, and still be on a different plane. A stone in a diverticulum, or considerably dilated ureter, may be a centimeter from the catheter and may therefore appear, roentgenographically, to be extra-ureteral. The method we have found most reliable is the injection of one of the opaque silver salts into the ureter, followed immediately by roentgenography. The tech-

nic of injection is similar to that employed in pyelography, except that it is unnecessary to inject more than 3-4 c.c. of silver. The procedure may therefore be regarded as free from any danger. The roentgenogram will almost invariably demonstrate one of the following changes caused by either mechanical obstruction or inflammation: 1st. Dilatation of the ureter at the site of or above the obstruction. It may be slight and confined to the portion of the ureter around the calculus; or 2. The dilatation may be diffuse, involving the entire course of the ureter above the obstruction. 3. The absence of silver above the roentgen-ray shadow combined with its presence below, may be considered absolute proof of intra-ureteral obstruction. At times the ureterogram will demonstrate a sacculatation, or angulation of the ureter, at the site of the calculus. Should none of the changes above enumerated be shown in the roentgenograph, a shadow even in direct line with that of the injected ureter may be regarded as of extra-ureteral origin.

Vesical calculus: I wish to call attention to the fact that roentgenography in this condition is not nearly as valuable an aid as in lithiasis of the upper urinary tract. Only a positive finding is of value; a negative one does not by any means exclude the presence of a calculus. This point was recently emphasized by Beer, who reported a series of twenty-two cases of vesical calculi, in only six of which did the calculus show in the roentgenogram. These roentgenograms were taken by a competent roentgenographer in the routine fashion after thorough catharsis. All of the stones were demonstrated cystoscopically, so that in vesical calculus this should be considered as our most valuable diagnostic procedure.

There are two methods that may be used as an aid in demonstrating a shadow where none existed before. One is the roentgenogram of the air-inflated bladder; the other, the coating of the calculus with one of the opaque silver salts previously described. When cystoscopy cannot be performed and stone is suspected, it would be advisable to try one or both of these methods.

The methods of examination for urinary lithiasis above described may appear too detailed, complicated and time-consuming, but it is my firm conviction that at the present time, several or all of the procedures are often necessary to establish the diagnosis of stone in the urinary tract and that to disregard them means to subject many patients to unfortunate exploratory operations at which nothing is found.

Renal tuberculosis: The frequent occurrence of this disease is considerably underestimated by many

general practitioners. In a large number of cases it is not recognized until its later stages complicated by marked bladder involvement, are already reached. The cases applying for hospital treatment are generally well advanced, the symptoms having extended in many instances over a few years. A fairly large percentage that have come under our observation were considered inoperable by reason of involvement of the other kidney, or extension to other organs, as epididymis, prostate and seminal vesicles. Early in the course of the disease the condition is very apt to be overlooked, and to be treated as cystitis, "irritable bladder," or pyelitis. The most prominent subjective symptom, and generally the earliest, is irritability of the bladder. This is present in from 85 per cent. to 90 per cent. of all cases. This symptom associated with an acid urine containing pus, which, with an ordinary stain, shows an absence of bacteria is most suggestive of urinary tuberculosis. The methods at our disposal for establishing the diagnosis of urinary tuberculosis are: Physical examination, urinalysis, guinea pig inoculation, cystoscopy with ureteral catheterization, excision of specimens from the bladder wall with the operating cystoscope, roentgenography, pyelography, tuberculin injections, and finally, exploratory exposure of the kidneys and ureters.

Physical examinations: The presence of nodules in the epididymis, prostate or vesicles when gonorrhea can be excluded, should be regarded as evidence pointing towards tuberculosis. These organs are affected in over 60 per cent. of the cases of renal tuberculosis.

Urinalysis: It is important to know that tuberculosis may be present without the occurrence of albuminuria. Microscopical pus is always present, even in very early cases. Unless a secondary infection supervenes the urine is acid in reaction, and generally shows no bacteria (other than the tubercle bacillus) in smears or in culture. The absolute diagnosis of urinary tuberculosis rests upon the demonstration of the tubercle bacillus. The latter can be demonstrated in smears in about 75 per cent. of the cases. For this purpose it is important to utilize 24-hour specimens, using the sediment obtained by standing or centrifugalizing. It is claimed that a somewhat higher percentage of positive results may be obtained if antiformin is employed. The differentiation of tubercle bacilli from smegma bacilli by smears is often impossible, and in every doubtful case the urine should be inoculated into guinea pigs. Even if severe smears are negative, recourse should be had to guinea pig inoculation if tuberculosis is suspected. The disadvantage of

this method is the time consumed—four to six weeks before a diagnosis can be established. By using the Bloch technic,⁶ however, this period can be considerably shortened. The method consists in injecting the centrifugalized 24-hour sediment subcutaneously below the inguinal lymphatic glands of a guinea pig, having previously traumatized these glands by manipulation. The guinea pig is killed in 10-14 days, and the inguinal nodes removed, macerated, and stained for tubercle bacilli. Used in conjunction with antiformin the method is still more reliable.

Cystoscopy: Combined with ureteral catheterization will afford information only second in value to the demonstration of the tubercle bacillus, in the diagnosis of the disease, and is of greatest value in its localization. An experienced cystoscopist can usually recognize renal tuberculosis even in its early stages. In extremely early cases, those which show no bladder or ureteral lesions, cystoscopy alone may not be of material aid, and catheterization must then be practiced. In the majority of cases, the vesicle lesions are most marked around the ureteral orifice on the side of the diseased kidney; occasionally, however, the lesions will group themselves around the orifice of the healthy side. The changes in the ureteral orifices may vary from simple congestion and bullous edema, to ulceration, infiltration and retraction, causing the so-called "golf-hole ureter." At a still later stage more of the bladder wall is involved; finally the tuberculous cystitis becomes more widespread and involves the whole bladder.

Chromoureteroscopy is of considerable value, first as an aid in finding the ureters in an inflamed bladder, and second, for cases in which ureteral stricture renders catheterization impossible. Ureteral catheterization should be performed whenever possible, and the segregated urines examined, chemically, microscopically and bacteriologically. The functional kidney tests when properly interpreted are of value. We rely almost exclusively on indigo-carmin. The excision of a portion of the diseased mucosa of the bladder as suggested by Buerger,⁸ especially that at the ureteral orifices, and its examination for tubercle bacilli, and for the microscopical picture of tuberculosis in stained sections may be of value in obscure cases.

Roentgenography: Early renal tuberculosis can rarely be diagnosed by this method. In the later stages, when caseation has taken place, the calcium deposits then present will occasionally cast shadows on the plate. These, as described by Braasch, may be of three types: 1. The cast of the case-

ated kidney, entirely or in part. 2. Single irregular shadows of varying size. 3. Multiple small irregular shadows scattered over the kidney area. The shadows cast by tuberculosis foci are usually more irregular in outline and hazier than stone shadows. Nevertheless the differential diagnosis from calculus will at times be difficult to make unless all the other data are taken into consideration.

Pyelography: Is seldom indicated in the diagnosis of renal tuberculosis. In fact we have not had occasion to resort to this measure in a single instance.

Tuberculin injections: This greatly neglected method is at times of considerable value as a diagnostic aid. Beer⁹ in a recent publication has called attention to its value in the diagnosis of obscure cases of renal tuberculosis. We do not employ the method as a routine, but in selected cases where other means have failed to establish the diagnosis. Old tuberculin is used so diluted that 5 minims equal $\frac{1}{2}$ mgm. It is advisable to first make a Von Pirquet test, as a guide to the initial dose. Tuberculin injections are given only in non-febrile cases after the temperature has been taken regularly for a few days. The initial dose is $\frac{1}{2}$ milligramme, gradually increased every few days if there is no reaction, with smaller doses. The maximum dose is 5 milligrammes. A positive reaction consists of at least two groups of symptoms. 1. There must be a general febrile reaction; and 2. A local reaction at the site of the tuberculous process, indicated by pain or tenderness. In some cases there may be a marked increase of tubercle bacilli in the urine. A combined general and focal response is almost invariably due to focal tuberculosis and such a response locates the diseased side. "A general minus a focal response is of no practical value as the most careful examination cannot exclude tuberculosis in other parts which may give the general reaction." (Beer.) Finally, when it is impossible by any of the foregoing methods to diagnose and localize the condition, or to determine whether the disease is unilateral or bilateral, exploratory lumbar exposure of both kidneys is indicated. The supposedly healthy kidney and ureter are first exposed, delivered into the wound and examined. The kidney may occasionally be normal in size and appearance, but if tuberculosis is present the ureter will generally be found thickened and infiltrated. If found normal the opposite kidney is explored.

With a proper application of the above mentioned procedures it should be possible to diagnose accurately, practically every case of urinary tuberculosis.

I have concerned myself chiefly with urinary lithiasis and tuberculosis, because these conditions are of greatest frequency and importance in the affections of the urinary tract. Before concluding I would like to call attention to a few diagnostic measures employed in various vesical conditions. Tumors of the bladder can be diagnosed positively only by cystoscopic examination, but the differentiation between benign and malignant growths can be determined with certainty only by the examination of specimens removed from the tumor. Specimens may be obtained in one of three ways: by carefully examining the bladder washings for pieces of tumor tissue; by exercising sections with the cystoscopic punch forceps or rongeur; or by examination of the pieces detached after the application of the high frequency spark. The cystoscopic punch forceps will also be of service for obtaining specimens of other bladder lesions, e. g., ulcer, tubercle, etc.

Diverticula of the bladder may be recognized cystoscopically, but a correct estimation of their size may be obtained only by roentgenographs of the silver filled sac. Occasionally vesical conditions are encountered in which cystoscopy cannot be performed. In such cases the differential diagnosis between prostatic enlargement, stone and tumor may be very difficult or even impossible by the ordinary technic of examination. It is in this group of cases that roentgenography of the air-inflated bladder, a method to which I have elsewhere called attention, is often of considerable value. A medium of air intensifies the roentgen-rays, rendering masses clearly visible which in another medium may be indistinguishable. The technic is simple; a small sized rubber catheter is introduced into the bladder, the organ emptied, and the inflation apparatus (an ordinary hand bulb) attached. The bladder is slowly and gently inflated until the patient describes a sense of fullness. The roentgenogram is then taken with slight pressure of the compression diaphragm. Intravesical prostatic enlargement, or the outlines of a tumor are distinctly shown. A calculus not visible in the ordinary roentgenogram will occasionally be well outlined in the inflated bladder roentgenogram.

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BONE AND JOINT SYPHILIS.*

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The total number of cases of syphilitic affections of the bones and joints may not be as large as those in some of the other classifications or divisions, but they are common, and quite often the diagnosis is extremely difficult and can be made only by a blood test or by the result of specific treatment.

Syphilitic bone and joint lesions belong almost exclusively to the tertiary period. There are, occasionally, in the secondary stage bone pains which are worse at night. There also may be serous synovitis, which is very similar in character to the infectious arthritis from other than the spirochaete, and follows much the same course. With refined methods of diagnosis, it is quite possible that these bone and joint pains of the secondary stage may be found to be much more common than we have thought in the past.

The tertiary period, however, furnishes most of the cases. In the bones we find local periostitis, osteitis, and osteomyelitis; in the joints gummatous synovitis and chondro-arthritis.

Local periostitis produces nodes, and gives to the tibia its roughened, beady feel. This condition is so common that it is a part of the routine examination in all cases of suspected hereditary or late acquired syphilis.

Gummatous osteitis may be either localized or diffuse. If it is localized it is possible to so weaken the bone that a spontaneous fracture may occur.

More frequently a syphilitic osteitis takes the form of a diffuse sclerosis and the cortex becomes much thicker and denser than the normal, and frequently produces bowing of the bone by general enlargement in length as well as thickness of one side. This is frequently seen in the tibia:—marked anterior bowing of the leg. Other bones may be affected, the forearm probably being second in frequency.

In this type of sclerosing osteitis the roentgenogram shows a bone picture not seen in other forms of osteitis and the diagnosis can be made by roentgenography alone.

The importance of a roentgenographic study in suspected syphilitic osteitis can hardly be overestimated. In practically all cases, even when the clinical symptoms may be misleading, a properly made roentgenogram and a correct interpretation of the

lights and shadows there shown will give a nearly, if not quite, positive diagnosis.

In the adult the differential diagnosis between syphilitic and non-syphilitic osteitis from the roentgenogram findings alone is somewhat easier than in early childhood. Some of the non-specific lesions of the adult that may cause doubt are chronic infections osteomyelitis, tuberculosis, sarcoma, carcinoma, osteitis deformans, chondroma, and bone cysts.

A description in detail of differential roentgenogram findings would not be of general interest, but a few of the gross differences may deserve mention:

In chronic osteomyelitis the processes of destruction and repair are going on in the same area. The roentgenogram shows thickened new bone, which is irregular in outline and may contain areas of markedly lessened density, so that the picture is one of irregular bone formation.

Tuberculosis is essentially a destructive process, and rarely attacks the shaft. There is involvement of soft tissues surrounding the bone, a general hazy appearance of the roentgenographic picture, and loss of bone detail.

Sarcoma, especially the periosteal type, may present some difficulties in roentgenogram diagnosis, but the tendency to bone destruction, the localization, and the presenting clinical symptoms usually make diagnosis easy.

Carcinoma is usually secondary to involvement of soft tissues elsewhere. It is essentially a destructive process; and more often involves the ends of long bones; the roentgenographic appearance is somewhat similar to that found in Charcot joints, but the clinical symptoms are markedly different.

Osteitis deformans shows bone changes similar to syphilis in that there is thickened cortex, and bowing of bone. The roentgenogram difference is that the entire shaft is involved in osteitis deformans and there is a bone striation quite different from the syphilitic bone. There will also be found more general bone involvement than in syphilis.

Bone cysts are infrequent; they usually do not present symptoms unless there has been an injury and the roentgenogram appearance is similar to that of giant cell sarcoma involving the medulla.

In adult life chondromata should present no difficulties to the roentgenogram diagnostician; in early childhood the cartilaginous involvement of the bones in the region of an epiphysis may be misleading, and it may be that a positive diagnosis can be made only by association of roentgenogram and other laboratory and clinical findings. If we bear

* Read before the Syracuse Academy of Medicine, March 2, 1915.

in mind that syphilitic osteo-chondritis usually affects the shaft and not the epiphyseal cartilage or epiphysis, we have one important fact.

I do not wish to be understood as thinking or advising diagnosis by roentgenogram alone in any suspected case because, however valuable may be the roentgenogram findings, they are only a part of our means of study and should always be used in conjunction with and to corroborate other methods. In this paper I am only trying to emphasize the importance of roentgenography and to show its value.

Gumma formation, when it occurs in a bone already afflicted with a sclerosing osteitis, is extremely painful, particularly at night.

Gummatous infiltration of the bone may go on to necrosis and suppuration, and when evacuated through the skin the characteristic ulcer is usual.

Sclerosing osteitis rarely suppurates, unless there has been injury, or the physical condition is bad, or too much mercury has been administered.

Osteomyelitis with destruction of tissue is frequent in the spongy bones and in the bones of the head and face. The frequently seen "saddle-nose" is a common example.

Nodes may form on the skull and go on to destruction and perforation.

The clinical evidence found in syphilitic joints is not so positive as in involvement of bone, and it is easy to make an incorrect diagnosis. The disease is chronic and closely resembles tuberculosis, and a careful study which includes a Wassermann test is essential. The roentgenograph is not often of diagnostic value. The following case will illustrate some of the difficulties in the way of making a diagnosis:—

Boy, aged 15. History of always being fairly well, although not physically strong and robust. Five children in family,—two older and two younger. Father and mother both living and well.

Blood examination on admission to Women's & Children's Hospital, Jan. 16, 1915, showed 4,500,000 red cells, 8,200 white cells, and 65% hemoglobin. His present trouble with knees dated from about August 1, 1914. Three weeks previous to this time he had been doing some work that required him to be on his knees each day. The right knee became sore and stiff and soon the left knee became similarly affected; some swelling and a lot of soreness and pain; knees soon became flexed and rigid. Until September 1st, he kept up and around and took rheumatism medicine. Early in September both knees were put in plaster in the semi-flexed position and he was kept in bed. Early in November he was taken to a hospital, casts were removed; roentgenogram studies made, a diagnosis of tuberculosis given; Buck's extension applied, and when the knees became straight they were again en-

cased in plaster and the patient returned to his home. These casts were left on until a week before his admission to the Women's & Children's Hospital. There were local symptoms, aside from the fact that tuberculosis rarely, if ever, affects both knees, that made me believe that the case was non-tuberculous and the report from a Wassermann examination was "4 plus." Dr. Wynkoop took charge of the medical treatment and the patient made a rapid recovery, and, in spite of the fact that these knees were immobilized for several months, he now walks about in quite a painless and normal manner. He can flex the left knee to nearly the normal limit and the right considerably beyond the right angle, and fully extend both legs. His anemia has also improved.

The majority of the cases of bone and joint syphilis that I see are of the hereditary type, and in hospital practice it is my routine to have a Wassermann test made in all early cases of joint trouble. I am forced to believe that not all cases of joint syphilis are bilateral; that we may have, and often do have, unilateral trouble, and that many of our former cases were syphilitic rather than tuberculous, and that had iodides and mercury been given long immobilization might have been avoided.

The Charcot joints, being the result of nerve degeneration, can hardly be classed as disease of the bone and joints, but the destruction of bone and joint structures is so markedly out of proportion to the pain and loss of function that each case is an interesting study. A man I saw with Dr. Buettner, paralyzed below the waist, in attempting to lift himself on his hands and arms, felt his elbow give way. He readily consented to show what happened. The olecranon ascended on the back of the humerus about one-third of the length of the latter. I pulled it down into position and he repeated the process several times, apparently entirely free from pain.

I recently saw a bilateral Charcot hip involvement in a woman who was able to walk with a cane and yet the roentgenogram showed complete destruction of the head and neck of each femur and weight was borne by the great trochanter pushed well up into the muscles near the crest of the ilium.

This affection is most common in the knees, and in any joint presents quite definite roentgenogram findings.

The diagnosis in bone and joint syphilis is difficult. With all our laboratory methods, including the roentgenogram, the diagnosis is frequently not possible until the effect of treatment can be observed.

I believe that many hips, knees, and other joints have been treated as tuberculous that in reality were syphilitic.

GUMMATOUS ULCERATIONS OF THE
BLADDER—A CASE REPORT.*

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M. M., male, silk importer, 46 years old, American, married, has two children—a boy of 8 years and a girl of 6; both apparently healthy.

He contracted a chancre in 1897, for which he was treated for about two years and discharged as cured. In January, 1912, a rash appeared on the chest and hands and the family physician promptly diagnosed it as syphilis. Wasserman reaction then strongly positive. He received five intravenous injections of 0.6 salvarsan; the rash disappeared and the Wassermann reaction was repeatedly negative.

The patient was brought to me for cystoscopic examination September 12, 1914, with the following history: About four or five months before, he began to experience pain about the pubes, which was quite severe at times, and shortly afterwards he began to have frequent desire to urinate, as often as every 15 to 20 minutes, with no trouble at night, however. The urine was very thick, ill-smelling and cloudy. The doctor treated him for cystitis with bladder irrigations and urinary antiseptics internally, without any results. About a week before I saw him the patient began to suffer from frequency at night also and tenesmus. The man was very anemic. He had lost about 30 pounds in the last 5 months. The urine contained pus and bladder epithelia, but was otherwise negative. There were about 12 ounces of thick, bad-smelling residual urine. Rectal examination of prostate and seminal vesicles negative.

Cystoscopic examination: Bladder slightly congested, very trabeculated; ureteral openings normal; trigonum very congested. A circular, ulcerated patch with infiltrated edges and ragged base, with necrotic tissue the size of quarter dollar on the left side below the ureter; another, similar, but smaller, ulceration a little to the right of this one, and a white hard glistening tumor covered by mucous membrane a little away from the left ureteral opening.

I made a diagnosis of syphilitic ulcerations and hard gumma of the bladder, and took blood for a Wassermann test, which proved negative. In spite of this I gave the patient an intravenous injection

of 0.6 salvarsan, and a week later had another Wassermann test made, which proved strongly positive.

Treatment: By air inflation of the bladder and through an operating cystoscope, I cleared away all the detritus from the ulcerations by curette and applied a 25 per cent. solution of silver nitrate to the ulcerations, tying a catheter in the bladder for 10 days, changing the catheter every 24 hours and irrigating the bladder with 1-5,000 iodine solution daily. Intramuscular injections of salicylate of mercury twice a week and inunctions of mercury every day; in two weeks I stopped the mercury on account of salivation, and I ordered potassium iodide 10 grains three times a day, increased to 50 grains a day.

The frequency and tenesmus stopped when I removed the permanent catheter and the urine cleared up at the end of the fourth week.

October 16: Cystoscopic examination shows normal mucous membrane except for the trabeculations; no ulcerations nor tumor found. The patient has gained about 8 pounds.

October 20: Wassermann test negative. Only mixed treatment given internally.

November 16: Wassermann test negative. All treatment stopped. The patient feels in perfect health, voids clear urine 3 or 4 times a day, none at night. He has gained about 15 pounds.

The points of interest in this case are:

1. The long delayed appearance of syphilitic ulcerations in the bladder after the initial lesion.
2. The negative Wassermann reaction turning to positive after an intravenous injection of salvarsan.
3. The quick response to antisyphilitic treatment.

1847 MADISON AVENUE.

RECURRENT DISLOCATIONS OF THE SHOULDER.

If after the reduction of a dislocation of the shoulder, the arm is not kept at the side and is soon carried forcibly into abduction, particularly if external rotation is added, the humeral head is easily pried out of the socket again because the capsule has not had time to heal. Its torn edges are again forced apart and the repetition of this accident will leave them permanently separated by the width of the gap necessary for a dislocation, the gap becoming filled in by new cicatricial capsule, much as the gap in a divided Achilles tendon is filled in. The lengthened axillary portion of the capsule will not now contract and a recurrent dislocation is established. Shortening by overlapping or folding of the lengthened capsule is indicated.—T. TURNER THOMAS in the *J. A. M. A.*

* Read before the American Urological Association, New York Society, April 7th, 1915.

THE OPERATIVE TREATMENT OF FRACTURES.*

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The treatment of fractures by means of making an incision, wiring, adjusting the misplaced bones, introducing screws, pins, plates, bone-dowels, etc., may be briefly stated.

In the first place, I am unalterably opposed to opening any fracture when the fragments can be properly reduced and held in opposition by any other measure. If for no other reason, the ever-

fifteen days, thereby adding much to his comfort and hastening the process of repair (Bier).

In operating on fractures the only safe plan is never to touch the wound even with the gloved finger, nor to touch anything that goes into the

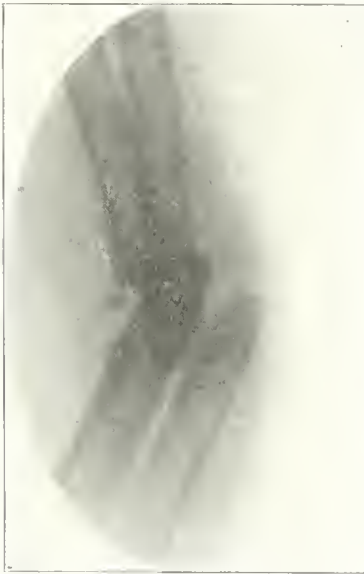


Plate I.—C. C. Sams—Radius and ulna, united fracture.

present danger of infection, no matter how perfect one's technic, positively contraindicates such procedure.

Bone is peculiarly vulnerable to pathogenic bacteria, and once infected is slow to rid itself of the enemy. The peritoneum is far more resistant to infection than is bone.

On the other hand, a fracture that is not amenable to non-operative measures, should be exposed and dealt with according to the indications.

Another consideration worthy of mention in this connection is the time the patient is confined to bed. For instance, the treatment of fracture of the shaft of the femur by means of Buck's extension requires the patient to remain in bed many weeks. Even the plaster of paris bandage method confines the patient unduly long. The operative method properly done puts the patient on his crutches within ten or

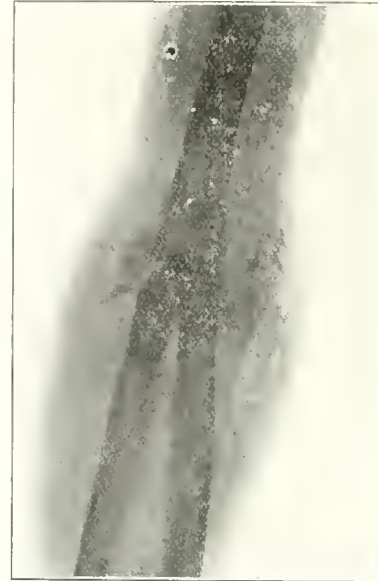


Plate II.—A. M. F.—Excision of elbow by circular saw. Two years after injury.

wound. This refinement of technic is easy enough when once acquired. Neither we nor our nurses touch the wound, or the sponge, or the end of the instrument that goes into the wound, or a needle,

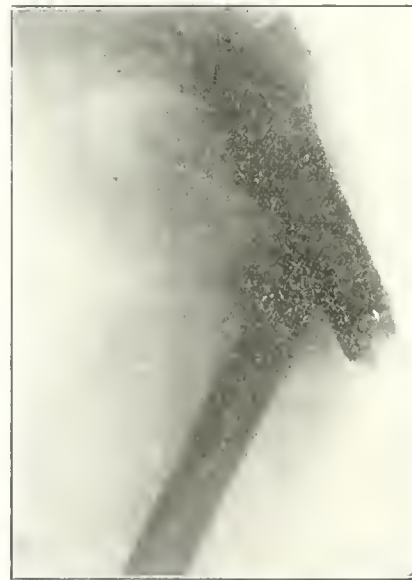


Plate III.—C. L. M.—Femur, fracture with vicious union. Four weeks after injury.

or the suture material. The sutures are tied with forceps, without any handling whatever. In the last case of fractured femur I operated upon I was

* Read before the Southern Medical Association, November 11, 1914, and the Guilford County Medical Society, February 4, 1915.

able to separate the planes of muscles without cutting a single muscle fiber or tying a bloodvessel or touching anything that went into the wound. The result was union by first intention and the patient up on his crutches on the twelfth day.

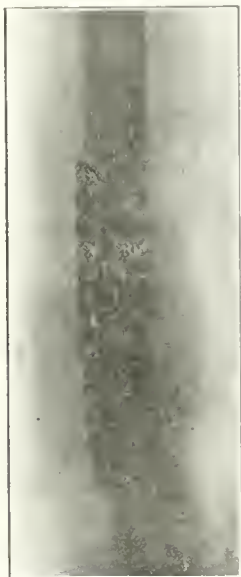


Plate IV.—C. L. M.—Femur, fracture, plated. Twenty days after operation.

I was surprised to see how quickly the instrument nurse acquires the necessary dexterity to do the so-called touchless operations, and further to note

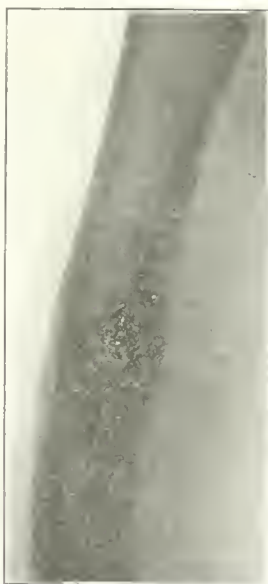


Plate V.—William A.—Ununited fracture, femur, six months' standing, resected, sutured with silver wire. Picture taken 21 years after operation.

that the nurse will use this technic in other cases not having been told to do so. The very best practise along this line is gained by doing dog surgery.

The results of the touchless method are no infection, prompt union, and early return of function.

To have to remove a wire or plate usually means that the case was infected. I have removed but one plate and that was in a fractured radius which was

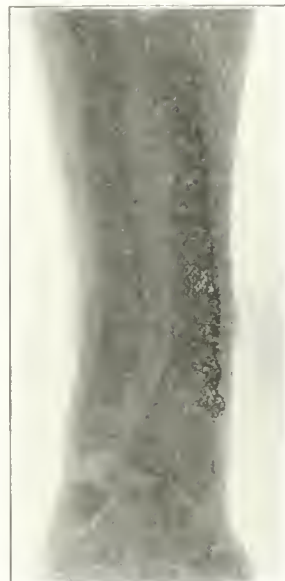


Plate VI.—Ernest W.—Radius and ulna, ununited fracture. Twenty-three months after operation.

infected before operation. Moreover, in this instance, union was perfect and the plate was no longer needed.

The first cut shows an old ununited fracture of



Plate VII.—Mack F.—Right radius and ulna, fracture. Sixteen days after injury.

the radius and ulna. I operated, a number of years ago, by the old method, handling the parts after the common manner; results—infection and non-union,

I know better now. Under the present methods I expect no infection and get none. I close a bone operation wound with all the confidence I do a simple clean appendectomy incision.

The second cut shows an elbow accidentally re-

Plate 3 shows a beautiful case of ununited fractured femur with vicious union, the picture taken four weeks after injury. Plate 4, of the same case, was taken twenty days after operation. The results attained were ideal.



Plate VIII.—Mack Floyd.—Right radius and ulna, fracture. Forty-five days after trauma, twenty days after operation.

sected by a circular saw. All the bones were cut off by the saw about two inches from the joint. Strange to say, the wound was not infected. I wisely refrained from touching the wound, simply painting it with iodine and applying a supporting



Plate X.—Mack Floyd.—Left arm. Three months after operation.

I think I may be justly proud of the next case (5). This man's broken femur was ununited for more than five months. Twenty-one years ago I went to his home off in the woods and, with the

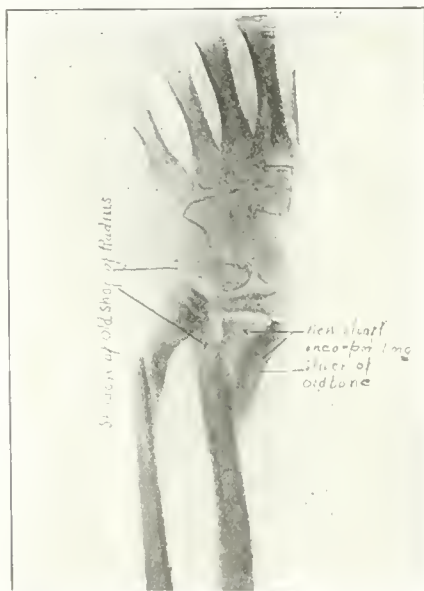


Plate IX.—Mack F.—Left radius and ulna, fracture. Seventy days after injury. Day before operation.

splint and sterile dressing. There is no bony union, although the picture would seem to indicate it. The man has a useful flail arm.

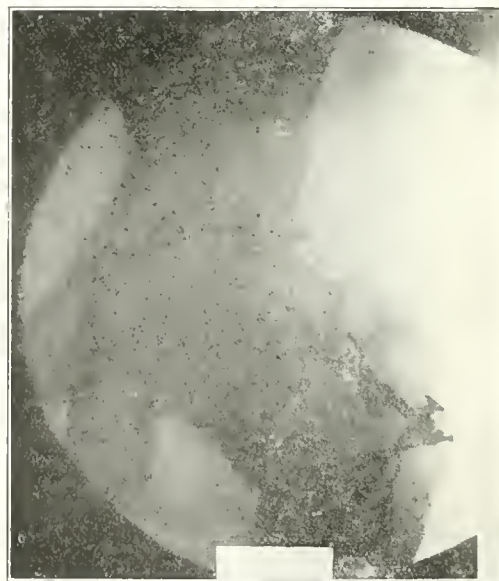


Plate XI.—Walter McC.—Femur, fracture of neck, nailed. Two years and one month after operation.

assistance of a number of excellent general practitioners, excised an inch and a quarter of the bone and wired the fragments together. The results were

primary union with perfect function. The skiagram taken three weeks ago shows the silver wire still *in situ*.

I have had such gratifying results with the operative treatment of fractured femur that I have come to welcome these cases to my clinic.

Figure 6 illustrates the results following operation in a case of fractured radius and ulna with vicious union. I chiseled the fragments apart, put a plate on the radius, secured primary union and most perfect results. This picture was taken two years after the operation.

The Figs. 7 to 10 show the several steps in infected compound comminuted fracture of both fore-

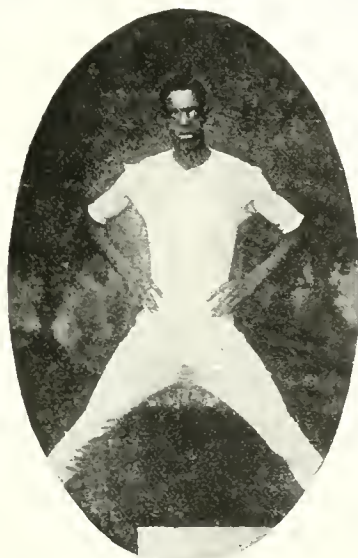


Plate XII.—Walter McC.—Right femur, fracture of neck. Two years and one month after operation.

arms. The boy fell fifty-five feet down an elevator shaft. He was brought into the hospital the next day highly septic, with temperature 103°, white blood cells 19,000. Of course, no operative procedure could be undertaken with a patient in this condition. The first picture (Fig. 7) shows the condition of the right arm. The left arm was in essentially the same condition. Note the dislocation of the radial epiphysis, and the fracture of the ulna. At operation three weeks later the epiphysis was placed back on the end of the shaft, just like putting a cap on a boy's head, but it would not stay. I then introduced a wire which also failed to hold the fragments together. A Lane plate applied, as seen in Fig. 8, kept them in perfect apposition. After ten weeks, the plate being no longer needed, it was removed, because a tiny bit of suppuration continued.

Figure 9 shows the left arm, a counterpart of its fellow. In this instance the infection was so

severe that I did not dare to operate before the seventy-first day. In the meantime nature had made a new shaft extending from the epiphysis to the side of the original shaft, and had absorbed the projecting portion of the shaft from the point where the new and the old joined. Now here is a peculiar thing: One sees the old end of the shaft in the picture, but when I opened the arm it was not there, it had been absorbed, to build the new portion with, let us suppose.

What I did was to fracture the shaft with a chisel at the junction of the old and new portions and bring them into line. It was necessary to refracture the ulna, excise a bit of the ends, and suture with catgut. Fig. 10 shows the condition of the bones three months after operation. To have secured useful arms and hands in this case is very gratifying.

Figure 11 shows an ununited fracture of the neck of the femur of four weeks standing. Following the method of Murphy, I made a U-shaped incision, sawed the great trochanter off, replaced the fractured neck, nailed it with ordinary wire nails, then nailed the trochanter back in place. Fig. 12, a picture taken two years after the accident, shows that the patient has a perfectly normal limb; indeed, unless one should see the scar, it could not be told which hip had been broken.

RADIOGRAPHY IN ULCER.

It is well to state that in uncomplicated gastric ulcer, the x-ray evidences as shown by the plate method are largely accidental. By uncomplicated ulcer I mean ulcer in which pyloric stenosis has not occurred, where types of hour-glass contraction have not taken place, where malformation of the stomach outline by excess of scar tissue has not ensued, where perforation is absent or crater ulcer does not exist. When it is recalled that the x-ray plate in gastric work is but a silhouette of the bismuth filled stomach at one instant of its exposure, it is readily seen why x-ray plates do not locate all ulcers. Further, when we realize that less than 60 per cent. of chronic gastric ulcers are of the complicated type, it is not difficult to appreciate that many ulcers must escape recognition in the x-ray plate. The most important evidence returned by the x-ray plate is the demonstration of various types of stenosis, the indication of the size of the stomach, differentiation between a simple ulcer and a gross carcinoma, and the relation of the stomach to adjacent viscera.—FRANK SMITHIES, in *Interstate Medical Journal*.

AMPUTATION FOR FRACTURE OF THE
FEMUR IN THE AGED.GOETHE LINK, M.D.,
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Fractures of the femur in those past sixty are very common accidents, those of the neck of the bone alone comprising one-third of all fractures occurring at this period of life.

It is well known that the mortality in femur fractures in the aged is high, though statistics covering this class of cases are not available, all ages being included in most lists. That there is good reason for considering them separately is shown by Walker's 112 cases (*Annals of Surgery*, vol. 47, p. 84), 55 of which occurred under sixty years of age with a mortality within six months of less than 4 per cent., while the remaining 57 cases, over sixty years, sustained a mortality of over 28 per cent. within six months.

The disability remaining in those who do not die is frequently so severe that death would be a welcome substitute. Even among those younger and able to work, this disability amounts to 50 per cent. of the earning capacity in 38 per cent. of all cases of femur fracture (Harris, quoted by Walker, *American Journal of Surgery*, vol. XXVIII, p. 450). The average period of disability in those recovering, of all ages, is given by Von Bergmann as more than one year. In the old individual this period becomes much longer and constitutes a fair part of the expectancy of life.

Whether open operation would be advisable after sixty, or whether it would improve results, remains to be seen. Plating fractures of the femur in the aged no doubt entails all the intrinsic disadvantages of that method and many others due to age and its incidents. At the present time open operation properly done is out of reach of the multitude.

It is upon these theoretical considerations that I wish to suggest amputation through the site of fracture in those past sixty where union and recovery seem unlikely. I have had only one opportunity to put it in practice.

For obvious reasons, it is not possible to give the mortality of thigh amputation in such cases. It is our opinion that it would be much less than the 28 per cent. which has been shown to result from the ordinary treatment. We might expect better results than in the conditions which have usually demanded amputation in the aged, such as gangrene, sarcoma, etc. Those most active and best able to recover from amputation because of the activity, are most apt to suffer an accident and fracture.

That recovery from thigh amputation occurs quickly, makes it a measure of especial value for the aged. Instead of a long painful confinement in bed, the patient may be placed in a chair comfortably within three or four days, and within a week or two can use crutches with aid. Recovery from the amputation having occurred, the patient is able to enjoy life far more with one good leg and crutches than if encumbered with a useless, painful, broken thigh. It seems, therefore, that we would be warranted in amputating every case of unimpacted fracture of the femur in those over sixty years of age. Fractures of the neck especially would justify such action as they seldom recover. In order to be properly conservative, however, let us advocate amputation in those cases where, after a reasonable lapse of time, the physician sees that his patient is going to die if longer confined by his broken thigh.

One advantage of this procedure is its general usefulness. There are few communities that cannot obtain the services of a surgeon able to do a thigh amputation, and it can be done if necessary in the most humble cottage.

Amputation through the point of fracture should usually be employed. Preference should be given to a type of operation which places the wound on the outer side most removed from soiling with natural passages so apt to occur in the aged. Spinal anesthesia I have found ideal in amputation of the thigh in old persons, having used it in conditions other than fracture.

The following case is reported in support of these suggestions:

I was asked by Dr. A. A. Kramer to come to Butler, Indiana, prepared to perform a thigh amputation. Upon arriving, I found a man aged seventy-three, owner and manager of a large farm, who had been kicked by a horse twelve weeks previously and had sustained a fracture of the femur slightly below the trochanter major. Since the injury he had been flat in bed suffering intensely and could hardly be moved sufficiently to be kept clean. The leg and thigh were covered with ulcers and opened abscesses. The patient had been in Dr. Kramer's care only a few days.

Attempts to turn the patient over so we could use spinal anesthesia caused so much pain that we desisted and gave ether. Amputation was done through the fracture with a long internal flap. As one of the abscesses could not be avoided, the wound was drained. The upper fragment of femur was found covered with muscular tissue which had grown fast. The lower fragment was smooth, and having been displaced backward, was impinging upon the great sciatic nerve, which was badly torn. No evidence of callus was seen.

On the fourth day after the operation the pa-

tient was placed in a chair. As it was summer time, he was taken out of doors each day where he spent most of his time while recuperating. He began using crutches two weeks after the amputation. He is now actively engaged managing his farm.

And credit for this idea is due Dr. Kramer, who planned the amputation of this man's useless extremity which was slowly causing his death.

608 INDIANA PYTHIAN BLDG.

CHOLECYSTOSTOMY OR CHOLECYSTECTOMY IN GALL-BLADDER DISEASE.

A REVIEW.*

W. C. GEWIN, M.D.,
BIRMINGHAM, ALA.

The mere diagnosis of gall-stones or gall-bladder infection is, in my opinion, sufficient to warrant an operation. While it is true that about ten per cent. of all people have gall-stones without symptoms, yet, when present they are a foreign body and are liable to cause alarming trouble at any time. Even if no acute condition arises, the mere presence of gall-stones is evidence of a pathological condition.

The pathology in gall-stone disease is much more simple in the early stages than it is later on, and when operated upon early the object sought may be attained with a much more simple and safe operation than when postponed until complications are present. Most of the mortality in gall-bladder surgery is due to unnecessary and ill-advised delay. Mayo¹ says that "Operations for simple gall-stone diseases are exceedingly safe. The operation of choice is cholecystostomy, which has but a small primary mortality, certainly not exceeding one-third of one per cent. from all causes; and the percentage of cures is very high, at least 95 per cent." With such a small mortality, and large per cent. of cures, and a knowledge of the frequency of complications incident to the presence of gall-stone disease, it certainly is not difficult to come to the conclusion that it is much safer to operate than not to operate in gall-stone disease, even though the patient suffers no serious inconvenience at the time operation is advised.

Cholecystitis being a predecessor of cholelithiasis, and cholelithiasis, when neglected until serious complications ensue, being attended with high operative mortality, I think Deaver is not far from right when he says that a low mortality rate obtained by a surgeon is a tribute to the knowledge and skill of his medical confrères, who sent him the cases. Most of the mortality in biliary surgery

is due directly to delay. It follows that a diseased condition of the gall-bladder, or of the gall-bladder ducts, or the presence of stones in either of them is an indication for operative intervention. The question then arises, which is the best operation to do?

Notwithstanding the immense amount of literature that has been written on the surgical treatment of gall-bladder affections, I am inclined to believe that as yet no well-defined principles have been outlined which we can invariably follow in our management of these cases without occasionally falling into the path of error. It seems that the present trend is toward more cholecystectomies, and fewer cholecystostomies, and judging from the literature which I have had occasion to read, it appears to me that the once favored operation of cholecystostomy is losing some of its old and at one time most ardent advocates. Mayo² in 1908 said, "Cholecystostomy we consider the normal operation for gall-stone disease. It is indicated in all cases in which the gall-bladder is not seriously damaged, and in which the removal of calculi will leave the cystic duct free, so that there will be no further trouble from inefficient drainage. Many prefer to remove the gall-bladder in this particular type, claiming that it is nearly as easy an operation, and gives more satisfactory results. In our hands it has one-third of one per cent. higher mortality, without any compensating advantage. In over eighteen hundred operations upon the gall-bladder and bile passages, in twelve hundred of which the gall-bladder was not removed, there was but a single case in which stones reformed in the gall-bladder." Mayo³ in 1914 rather suggests a change of mind when he is quoted as suggesting that "While cholecystostomy may be the proper method of operation in gall-stone disease, in which the gall-bladder is otherwise normal, and the ducts are open, it is not the method of choice, and is not satisfactory in cholecystitis." Louis Frank⁴ of Louisville in 1912 said "Cholecystectomy is comparatively seldom indicated in the treatment of gall-bladder infection, although it constitutes an operation which has its legitimate field of usefulness. At the same time its contraindications and limitations must not be overlooked." In contrast to this statement Frank⁵ recently makes the assertion "As a matter of fact cholecystectomy is now largely indicated in gall-stone disease, and it may be said that practically all cases of cholecystitis, and a large majority (probably 80 per cent.) of cases of gall-stone disease should be treated by cholecystectomy, rather than by cholecystostomy." D'Arcy Power⁶ of London

* Read before the Medical Association of the State of Alabama, Birmingham, April 20, 1915.

in an article on gall-stones read before the Cardiff, Wales, Medical Society, in 1913, said "The exact operation performed does not seem to make a material difference to the result obtained. In my earlier cases the gall-bladder was usually opened, drained, and allowed to heal by granulation. The 'ideal' operation was performed occasionally, that is to say the gall-bladder was incised, the gall-stones were removed, and the gall-bladder was sutured at once without any drainage. This method has always seemed to me to be attended with some degree of risk, because the complete closure of an unhealthy gall-bladder may fail to occur, however satisfactory the line of suture may appear at the time of operation. When the abdomen is closed, the surgeon is left in ignorance of many serious post-operative complications, such as hemorrhage from, or leakage into, the gall-bladder, which may need immediate treatment to be effective. I have therefore abandoned the 'ideal' operation, except in the very simplest cases, and even in those I employ it with a certain degree of reluctance." Power further states that "In looking through the notes of the operations I find for the last two or three years I do more cholecystectomies than I did at first; that is to say, I have removed the fundus of the gall-bladder in most of the cases, ligaturing the neck, disinfecting the stump, and afterwards burying it by bringing the peritoneum over it on the same line as is usual in appendix operations." Frank⁷ in 1914 further says "Cholecystectomy is directly in the fore-front at the present time, and its exact status has yet to be determined. Just what may be the preponderance of opinion, and what may become the final practice as to the disposition of the gall-bladder I would fear to say." Moynihan as early as 1902 advocated cholecystectomy as a routine procedure in cholelithiasis.

It is now generally believed that gall-stone formations is almost invariably preceded by an infection of the gall-bladder, or bile-ducts, or both; also, it is a well established surgical principle that where there is infection the first and most important measure is adequate drainage. This being true, I do not believe the so-called "ideal" operation can ever come into prominence in gall-bladder surgery. I think the risk assumed in closing an unhealthy gall-bladder, dropping it back in the abdominal cavity, and closing the abdominal incision, without any way whatsoever of determining the progress of repair is entirely out of proportion to the benefits, which one might hope to derive by such a method. Instead of gaining favor as our knowledge of gall-bladder surgery increases, in my opinion it will be relegated to that already large number of obsolete and unscientific operations.

As to the reformation of gall-stones after cholecystostomy, Maurice H. Richardson⁸ said "Since my first operation on the gall-bladder in 1886 or thereabouts, I have never seen, so far as I can recollect, a single case of recurring stones—of stones formed once the gall-bladder had been thoroughly drained. It is unheard of in my experience to open a gall-bladder that has once been drained, and to find gall-stones of recent formation, i. e., gall-stones that are soft and bright colored. On the other hand it is not uncommon for me to remove a stone overlooked at the original operation, especially when the operation was performed by a man of small experience." Kehr states that he himself overlooked stones in 2.5 per cent. of 1,105 cases operated upon before 1909. There is no doubt that in most cases in which stones are found after cholecystostomy had been performed, they were left at the time of the primary operation. This is a point strongly in favor of cholecystostomy. On the other hand, cholecystectomy, as a secondary operation, is usually very difficult, owing to adhesions resulting from the primary operation. This is a point in favor of cholecystectomy as a primary operation.

After all, when it comes to a decision as to just what operation should be done in a case of gall-stones disease, I believe it largely a question of technical expediency in the given case, and that only mature surgical judgment can dictate what is best. There are, of course, various complications, such as malignancy, gangrene, empyema of the gall-bladder, hydrops, cystic duct obstruction, etc., which may make cholecystectomy imperative, but it is in those cases in which the cystic duct is apparently healthy and patulous, and the gall-bladder capable of regaining its normal function, that we are often in doubt as to the better procedure, cholecystostomy or cholecystectomy.

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HEMATURIA.

Every patient with hematuria should be given the advantage of an early cystoscopic examination. It is the early recognition of pathological conditions in the urinary tract that renders their treatment most favorable and beneficial to the patient.—E. O. SMITH in *The Lancet-Clinic*.

AINHUM, A CASE REPORT.*

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The subject of this report is one of those rare surgical conditions seldom encountered in the United States and infrequently recorded in the literature, for Keen's Surgery speaks of only twelve cases collected in this country (1911). Like some other exogenous diseases it seems to affect only the colored race and gets its name from the African continent. Ainhum is said to be derived from the Negro word meaning "to saw" (Century Dictionary), undoubtedly because of the characteristic feature of the disease by which the affected toe is spontaneously amputated as though by such an instrument. The disease is found in Africa, India and South America, especially Brazil, affecting only the colored race, especially the Negro, and considering our large Negro population, it is rather remarkable that the disease is so rare in this country.

Ainhum affects the little toe singly or bilaterally, occasionally other toes or the fingers, beginning as a furrow or groove around the base in which the skin becomes thick or callous without any primary ulceration. The effect is that which might be produced by a tight string wound about the part. The further course is slow, taking from two to twenty years. As a rule it terminates in spontaneous amputation. The band gradually contracts and strangles the toe, producing finally absorption of the bone.^{2 4} As the furrow deepens the distal portion of the toe becomes bulbous and swollen, the constriction finally dividing the toe. The whole condition being very chronic it is as a rule free of pain, though in my case pain was present early and was sufficiently marked to bring the patient to the clinic.

The etiology is shrouded in a good deal of mystery. It has been attributed to arteriosclerosis, leprosy, trauma and neurotrophic disturbances, a list of causes showing at least a rich diversity and not related by any proof. There is no reference to any case occurring in any subject except a Negro. It may be hereditary. Unna maintains that the process is a linear scleroderma in which the epidermis shrinks and causes pressure necrosis. If arterial degeneration were the cause the disease would certainly occur more commonly and not be limited to the Negro, nor would trauma manifest such predilection of site as the fifth toe; and certainly the

process does not seem to bear any similarity to leprosy in its pathology or etiology. We have a more logical explanation for the unusual features of the disease in considering it as a trophoneurosis resembling Raynaud's disease, as is suggested by Dr. Walter D. McCaw.² The predilection of ainhum for the fingers or toes at once brings to mind the latter disease which it also resembles in its chronic course, especially in the absence of any primary suppuration.

There are no symptoms except those of the immediate disease. The most noteworthy feature is that it is a chronic process going on to automatic cure by self-amputation, unless there is added a local infection or secondary ulceration with independent symptoms which are unrelated to the original disease. The absence of symptoms and of any great functional impairment renders the victim in-

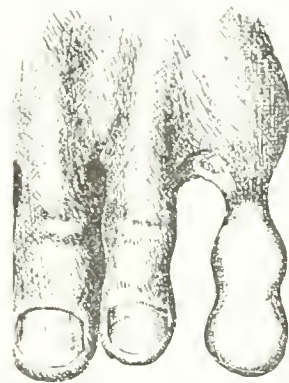


Fig. 1. The right foot of case of Ainhum, showing constriction with ulceration. From a sketch by Dr. Philip Schmahl.

different to the lesion in its early stage and he applies for treatment only when the deformity is marked or pain is produced by inflammatory changes, the result of this infection or ulceration. Treatment accordingly is practically always amputation.¹ If the case is seen early an effort may be made at cure by following the suggestion of Dr. Leonard Freeman, who says that: "It is claimed that early division or excision of the constricting band may check the progress of the disease."³

CASE.—B. M., aged 44, single, male, colored, porter, native of U. S.; admitted to the Flower Hospital first December 16, 1912, discharged cured December 31st, readmitted November 14, 1913, discharged cured November 22d. Born in Florida, he lived in Georgia most of his early life. He was unable to give any family history and his personal history showed nothing of interest.

Physical examination: A well developed Negro whose general physique was excellent; heart and lungs negative; abdominal examination normal, except a slight increase in the lower border of the liver. Denies all evidence of syphilis. Four urinary examinations were negative; his blood pressure was 156 and blood count was normal.

* Presented with specimen before the Academy of Pathological Sciences, January, 1913.

Present trouble: He first noticed two years before (in 1910) a tiny furrow on the plantar fold of the fifth toe of the right foot that was becoming hard and callous where the toe joined the foot, free of pain or swelling. There was no apparent change in this condition till two or three months before he applied to us; then the furrow extended around the whole toe, which was painful and tender. On admission it presented the appearance shown in figure 1. The skin, especially above and below the furrow, is dry and harsh; the furrow is a rim of callus, the nail almost atrophied and very brittle. The distal end of the toe is enlarged and distinctly globular. A tiny spot of ulceration is present in the fold between the fourth and fifth toes. A series of skiagrams show no bony change whatever. On December 20th a typical amputation was done through the shaft of the fifth metatarsal so that the incision lay well back in sound tissue; the sutures were removed December 28th, healing by first intention.



Fig. 2. The left foot of case of Ainhum as developing one year subsequent to the disease shown in the right foot. Note development of callous constriction and distinct narrowing of the base of the fifth toe. From a photograph.

Subsequent history: One year later the foot operated on was normal, the scar barely perceptible, and painless. But the man said he thought the other foot was affected. On his first admission the fifth toe of the left foot seemed perfectly normal; now it presented the appearance shown in the photograph, figure 2. A band of scar-like tissue could be seen and felt very clearly beginning to encircle the toe, the periphery of which was a trifle bulbous; there was no ulceration or inflammation; it was not sensitive; but he was anxious to be rid of it, fearing the development of the disease. Accordingly the toe was amputated as in the first instance; the wound healed *per primam* and he was kept under observation for two months, and when last seen was perfectly well and not a bit inconvenienced by the losses sustained in both feet. As we wished to preserve the specimens intact no pathological examination was made; a number of these

cases have been reported as showing no definite histological changes, and the specimens are being kept for didactic purposes.

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- ² Keen's Surgery, Vol. IV., page 1137.
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- ⁴ Trumann Abbe, Medical Record, March 18, 1911. A study of two cases, with four diagrams.

TRANSPLANTATION OF BONE.

1. Transplantation of bone is preferable to the metal plate in the treatment of cases of non-union with the probable exception of the femur.
2. Clinical and radiographic studies tend to show that the hard cortical bone used as an intramedullary plug is slowly absorbed, and does not persist as a permanent splint. In its absorption it promotes osteogenesis.
3. Absolute fixation is to be maintained, particularly in the humerus, where a transplant is used.
4. The inlay method is the method of choice where possible. By it an anatomical approximation of tissues is possible: periosteum to periosteum, cortex to cortex, and medullary lining to medullary lining.
5. Hard bone placed in the spongy bones in the epiphyses is gradually absorbed, to be replaced by bone normal to that area.—M. S. HENDERSON, in the *Journal-Lancet*.

BONE CYSTS.

Cysts of bone should be detected in their incipient stages before extensive destruction of the medulla has taken place.

Early operation results in prompt cure, and prevents deformities and extensive bone plastics.

A localized trauma followed by persistent but not severe pain, and localized but not true "winching" tenderness—symptoms and signs of an untreated "chipping" fracture—should arouse clinical suspicion of a minute, early bone cyst, the corroboration of which may be afforded by close scrutiny of a roentgenogram at the site corresponding to that of the localized tenderness.—P. G. SKILLERN in *The J. A. M. A.*

PREVENTION OF POST-OPERATIVE GAS PAINS.

To obviate distention and gas pains after laparotomies, pass a tube up through the rectum into the descending colon *before closing the abdomen*, and retain it there several days. With the operator's hand to guide it it is easy to pass the tube sufficiently high.—J. J. BRONSON, M. D., Dubuque, Iowa.

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WALTER M. BRICKNER, M.D., Editor

NEW YORK, JUNE, 1915.

ARE THE ORDINARY HERNIAE EVER TRAUMATIC?

The existence of an umbilical, femoral or inguinal hernia is sometimes noted by the individual or by the examining physician after a fall or other injury; or discovered independently of a recent effort or injury, the patient is apt to think back to some time when he "lifted a trunk" or "moved a piano," to account for the "strain" that caused the "rupture." (People generally regard herniae as due to *strains*, and the unfortunate term *rupture* clearly gives them title to such belief.) And thus it happens that claims on accident insurance companies are made by policyholders who develop herniae—claims that are often made by the individuals in entire good faith and are certified by their physicians in equally good faith.

Are such claims justifiable in fact? Are physicians properly interpreting the pathogenesis of herniae in acknowledging sudden abdominal strains as their causative factor? We believe they are not.

Whether or not herniae do or may arise from such strains is not purely a medical question. It is an economic question of considerable importance, not only because of claims made by individual holders of accident insurance policies but, more especially, because Workmen's Compensation legislation puts on the employers and their insuring companies the burden of disabilities incident to their occupation, that befall the workers in many industries.

Traumatic abdominal herniae do, of course, occasionally occur as the immediate or remote result of crushing or penetrating injuries to the abdominal wall or diaphragm. But herniae through the umbilical, inguinal and femoral canals are never traumatic, we believe (except to be quite exact—in such rare instances in which a penetrating injury may have actually occurred to those canals). Herniae discovered at those sites were present *before* the strain, fall or blow—potentially, or small or, most often, fully developed but perhaps unnoticed. That is to say, the prolongation of peritoneum and usually, if not always, some, at least, of the hernial contents were present and the strain or injury, if it had anything whatever to do with the hernia merely hastened the inevitable filling and stretching of the pre-existing sac.

We are glad to see that this view, which we have long held, is also that of Alexis Moschcowitz, of New York, whose studies of the pathogenesis and anatomy of abdominal herniae are widely recognized. In an address on The Relation of Hernia to the Workmen's Compensation Law (*Medical Record*, April 3, 1915), he boldly states, and supports this with anatomical data, that the abdominal herniae do not result from trauma.

We are strongly inclined to go further than does Moschcowitz and to accept the congenital theory of herniae, which assumes the presence of the hernial canal, from birth, of a projecting knuckle of peritoneum, which, however, may not become occupied by abdominal contents for many years. In the "congenital inguinal hernia" of the text-books a tunica vaginalis has not separated off from the processus vaginalis which remains in the inguinal canal and scrotum and contains the testicle and the bowel or omentum. But the so-called "infantile hernia" and the "hernia into the funicular process" are not a whit less congenital. In them the processus vaginalis is closed off from the testicular tunic, but it remains in the canal. And these forms are observed in early infancy quite as often as the variety long recognized as "congenital." It is not difficult, then, to assume for inguinal herniae of later appearance that a longer or shorter portion of the processus vaginalis persists in the canal, projecting with the cord through a small hiatus in the transversalis fascia which, in after years, becomes stretched and allows the peritoneal pouch to fill and enlarge. The purely extraperitoneal forms of direct inguinal herniae may likewise be assumed to exist, potentially, at birth—an assumption that best explains their frequent bilaterality. The congenital theory is based, then, on recognized embryonal proc-

esses that take place at the inguinal and umbilical outlets, and for femoral herniæ it is not difficult also to conceive of a small process of peritoneum existing at birth in the femoral fossa.

The theory of the fetal preformation of herniæ is supported by the admittedly congenital varieties of inguinal and umbilical herniæ, by the hernia associated with non-descent of the testis and by hernia of the ovary, which, we believe, are also accepted as congenital; it is the most satisfactory explanation of the common occurrence of herniæ in infancy and childhood; it best explains the rapid development of complete (scrotal) herniæ, the frequency of bilateral inguinal herniæ, and many other factors. It is an hypothesis obviously difficult to prove, however, and unless it is generally accepted it will remain of scientific rather than of practical interest, lacking the economic importance that attaches to the relation of trauma to the development of abdominal herniæ.—W. M. B.

ANOTHER CANCER "TREATMENT."

There was recently published in the *New York Medical Journal* (May 15th), and immediately and enthusiastically heralded in the lay press, the account of a new "Treatment for Inoperable Cancer." This "treatment" is given out by S. P. Beebe, M.D., professor of experimental therapeutics, Cornell University.

"The method in question is not original with the writer. During the last year certain modifications and possible improvements have been made, but the fundamental idea and the composition of the therapeutic agent were originated by Alexander Horowitz, Ph. D., an Austrian biologist and chemist."

* * * "As administered by Dr. Horowitz, the treatment consisted of the repeated application of a poultice to the affected parts and the administration internally in the form of an extract, either as a liquid or as a pill, of certain substances contained in the poultice itself." * * *

* * * "The powder from which the poultice is made contains a considerable number of substances of plant origin. Seeds, roots, bark and flowers taken from a number of different plants are prepared in the form of a powder, from which Doctor Horowitz made a poultice. The powder contains the following substances: *Menyanthes trifoliata*, *Melilotus officinalis*, *Mentha crispa*, *Brassica alba*, *Anemone hepatica*, *Viola tricolor*, *Anthemis*, *Fructus colocynthis*, *Lignum quassia*, *Urtica dioica*, *Radix rhei*, *Hedys hyssop*."

Beebe refrains from telling why the Austrian biologist and chemist selected just this particular lot of "herbs" and spurned the ruddy tomato, the

fragrant onion and the luscious squash. And with admirable restraint Beebe also resisted the no doubt great temptation to tell how the plant agencies are prepared and in what proportion they are mixed.

"Brief directions and precautions for the safeguarding and use of this treatment may be of interest,"

he says, and then he solemnly proceeds to announce that

"a poultice is prepared for application by the usual methods. The powder is mixed with a small quantity of boiling water sufficient to make a thick paste; this is spread upon gauze, covered by one layer of gauze and applied to the affected part in the same way as one would apply a mustard plaster. The skin must be first covered with a layer of petrolatum. * * *"

The profession, for whose benefit, of course, the article was written, will be grateful for the warning that this particular poultice must be prepared and applied just like any other poultice; and, after receiving this abundant information, he would be presumptuous, indeed, who wanted to know what's in the poultice.

In addition to the pills and the paste, Beebe has employed "this therapeutic agent" by injection directly into the tumor mass, to produce in its depths an intense reaction. Believing that the general improvement of the patient seems to be "somewhat greater" than might be expected from the application of a local irritant or the cleaning up of superficial infection, Beebe inclines to the belief that "this therapeutic agent" produces beneficial constitutional effects. He has therefore employed it in hypodermatic injections at a distance from the neoplasm. Although he refers to "fairly definite responses in the growth" from these distant injections, it is astonishing that a professor of experimental therapeutics should draw any conclusions from this in cases every one of which also received injections into the tumor and, incidentally, most of which were also treated by radiotherapy. Beebe refers, cautiously, to the possible use of the plant substance mixture intravenously and mentions its trial upon a dog without causing marked disturbance to the circulation or to the excretory organs.

As Beebe says, it is quite justifiable in the conduct of cancer therapy research to make trials of empirical remedies; but it is amazing that a professor in one of our leading medical schools should publish, as a result of his observations of such an empirical method, a wholly unscientific, even though only preliminary, report based on results by no means convincing and, many of them, quite unsatisfactory.

Since he publishes not a cancer cure but merely "a treatment" of inoperable cancer we pass over, though reluctantly, the fact that in his case reports he gives no dates and but scant records of the periods of observation. These cases, which Beebe selects from among others (total number not stated) as "fairly representative" of his results, are sixteen in number, divided into three groups.

The first group is of three private cases of superficial skin cancers—two rodent ulcers of the forehead and one epithelioma of the temple. All were healed by applications of the poultice, a result which, as Beebe admits, and as the histories of the cases suggest, might have been obtained by other methods, "such as radium, x-ray and various forms of escharotic paste."

The second group is of seven "hopelessly incurable and inoperable" cases at the General Memorial Hospital. Of these seven cases five died under treatment and the other two refused to continue it. Of these two, one was greatly relieved generally and locally by the breaking down of the mass and the surgical evacuation of the detritus, the neck sinuses healing but not the growth in the floor of the mouth. Of the five who died, two had been ameliorated by the shrinkage of the growth. All of these patients had x-ray treatment also.

The third group of six cases, treated with the assistance of Dr. J. Wallace Beveridge, in the Polyclinic Hospital, Beebe considers interesting because, he says, *they were treated entirely by hypodermatic injection of the extract.*

He must have meant injections with a hypodermatic syringe, for *everyone of these cases had many injections into the tumor mass.* None of these cases had coincident x-ray treatment, however. Following are these six cases:

Recurrent calloid carcinoma of the rectum. During six weeks stay in the hospital sixteen injections into the tumor mass. Large broken down masses were discharged, with great relief of local symptoms and freedom from pain. "After leaving the hospital the patient had a few injections into the arm, and he continued to gain in weight and strength."

Recurrent hypernephroma of loin, growing rapidly. Twenty-two injections into the tumor, which broke down and discharged. After leaving hospital, injection of extract in the arm every second or third day (period not stated); he "continued to gain in weight and strength, and the tumor mass *was* practically entirely gone" (italics ours).

Recurrent carcinoma after breast amputation. Mass three inches in diameter in scar. X-ray treatment *a short time prior* to admission. Injections into mass and in arm. Mass broke down and discharged, complete healing, subsidence of edema of arm.

Three small skin nodules and one auxiliary gland, recurrences after amputation of male breast. Four injections into the nodules and the gland. Absorption and disappearances.

Large carcinoma of the bladder. Injections only into

the tumor through a suprapubic opening. Suppression of urine. Death.

Epithelioma of floor of mouth and glandular extension. Injections into glands and into arm and poultices. Still under treatment. Pain now very little, mouth clean, lymph nodes almost absorbed, gained 13 pounds, looks and feels much stronger.

This third group makes a much better showing than the second although it demonstrates no peculiar therapeutic virtue in the plant mixture.

Of the sixteen cases, three were epitheliomata, all healed—which might have been accomplished by other escharotics. Of the remaining thirteen cases, six died under treatment, two having been temporarily relieved locally. Of the seven others who survived the treatment, two refused to continue it, but one of these was much relieved, although still far from cured. Among the remaining five who were ameliorated by the shrinkage or, in two cases, the disappearance of the growth, in only one was the disappearance by absorption without external discharge, and in that one the nodules, and gland, *which were not examined*, were quite small and "except for the fact that the areas were already a mass of scar tissue the recurrent nodules might have been removed by operation."

Says Beebe,

"If an actual diminution and regression in the bulk of malignant tissue is taken as a criterion by which to judge of the effect of this remedy, it is the writer's opinion that the evidence presented can lead to but one conclusion."

There will, indeed, be but one conclusion, and he will then be convinced that "diminution and regression in the bulk of malignant tissue" is not a criterion by which to judge the effect of a cancer remedy. Such a local necrotizing action—and there is no acceptable evidence produced that the "seeds, roots, bark and flowers" used by Beebe have any other action—has been produced, with quite as good results, by other agencies selected with far more scientific rationale than this queer garden compound.

The Horowitz herbs will go the way of all the rest of these agencies. If the horticultural effusion had appeared only in the medical press it would have died a peaceful death in the bosom of the profession.

THE JOURNAL, at any rate, would have passed it by merely as unfortunate for the scientific dignity of the medical school and the hospitals from which it came, and with the silent observation that Beebe's cancer studies had again led him into undue enthusiasm. But, unfortunately—and Beebe's article shows that he feared it—the new "treatment" found publication also in a daily and in a Sunday mag-

azine issue of at least one prominent newspaper. The result will be, probably already has been, the pilgrimage of unfortunate sufferers for the cure that will not be forthcoming. While this lasts, of course, those who have been thus unexpectedly advertised will profit by the publicity.—W. M. B.

CANCER NUMBER.

The next issue of THE JOURNAL will be devoted to Cancer. The contributed articles will deal with the Early Diagnosis of Carcinoma; of the Breast, by Jabez Jackson; of the Stomach, by Irving S. Haynes; of the Esophagus, by Willy Meyer; of the Uterus, by Robert T. Frank; of the Bladder and Prostate, by J. Bentley Squier and by Edwin Beer; of the Air Passages, by Emil Mayer; of the Rectum, by Jerome Lynch; of the Pancreas, by Burrill Crohn; Carcinoma in General, by J. H. Carstens; and other Aspects of Cancer, Clinical and Pathological.

Surgical Suggestions

Patients suffering with sciatica should be examined carefully for a possible lesion of the pelvic bones, the vertebrae or the spinal cord itself.

Simple retroposition of the uterus is quite normal to many women and should not be "corrected" without clear indications.

It is not reasonable to believe that a retroposed uterus by its mere weight upon the bowel can cause constipation.

Among the diagnostic possibilities of a flattened or rounded mass in the midline of the abdomen it is worth remembering fused or horseshoe kidney. The diagnosis can be established by pyelography.

The occurrence of dermoids in the midline of the perineum is too often forgotten. Situated at the anterior anal margin a dermoid cyst may be mistaken for a hemorrhoid, or if discharging through a sinus, for an ordinary "fistula in ano." Situated more anteriorly the sinus is often mistaken for a urethral fistula.

A strong solution of potassium permanganate painted over macerated, sodden skin surfaces, as between the toes or about the anus, and allowed to dry, gives much relief and often effects a cure. The application may be made daily or less frequently. Keep the painted surface dry with talcum powder and absorbent cotton.

Surgical Sociology

Ira S. Wile, M. D., Department Editor.

1913 MORTALITY RATES.

Among the causes of death, surgical shock and traumata of various kinds incident to operative procedures find no listed place. Diagnostic surgery has practically a negligible mortality, while prophylactic or therapeutic surgery is never considered in accounting for death.

The principal diseases causing more than one half of all the deaths in the United States include tuberculosis, pneumonia, heart diseases, renal diseases, apoplexy, cancer, diarrhoea and enteritis, diphtheria and typhoid fever. Naturally, from the standpoint of surgery, the relation of heart disease and renal disease to the general mortality is of distinct importance.

While the mortality rate for tuberculosis has been declining yearly, that for heart diseases has been increasing. In 1913, the death rate from heart diseases, organic diseases of the heart and endocarditis was 147.1 per hundred thousand. The death rate from Bright's disease and nephritis for 1913 was 102.9 as contrasted with the mortality rate of 89 per hundred thousand in 1900. This rising mortality rate from these serious causes indicates the importance of careful examination of the heart and kidney function whenever possible before operative procedures are attempted. The mortality rate, slowly increasing over a period of years suggests a large increase in the prevalence of these conditions.

The vital statistics for 1913 issued by the Bureau of Census reveals the fact that improved sanitation and widespread education in the laws of health are playing an important part in lessening the serious menace of tuberculosis. Within the nine years from 1904 to 1913, the mortality rate from tuberculosis in all its forms fell from 200.7 to 147.6 per hundred thousand. The decline has been consistent and continuous without any of the fluctuations that had existed prior to 1904. The marked increase in tuberculosis institutions and the prompt attention which is now given to tuberculosis in its incipency is responsible for the decreased number of cases of bone and joint tuberculosis of severe types which present themselves for clinical diagnosis and therapeutic treatment.

The great increase in cancer deaths during 1913 is probably due in part at least to more accurate diagnoses and greater care in medical registration. The rate rose from 63 per hundred thousand in

1900 to 78.9 in 1913. From the standpoint of diagnostics and research, it is worth while noting that 40 per cent. of the deaths from carcinoma resulted from cancers of the stomach and liver.

The death rate from diseases of the bones and joints, excepting tuberculosis and rheumatism, has decreased very slightly during the last few years. The general rate for 1913 was 2.6 as opposed to 2.8 as the average for the years 1906 to 1910.

The number of deaths from specific conditions such as amputations apparently is decreasing very markedly and the general mortality rate from this cause is below one-tenth of a per cent., per hundred thousand population.

Incidentally, violent deaths in 1913 had a rate of 85.3 as compared with the general average 86 for the years 1906 to 1910. It is interesting to find the actual number of deaths from traumatism of different types in 1913. For example, by firearms 1,572, by fall 9,747, traumatism in mines and quarries 2,385, traumatism by machines 1,526, railroading accidents and injuries 8,212, street car accidents and injuries 1,988, automobile accidents and injuries 2,488, injuries by other vehicles 2,381. Almost sixteen thousand accidents occurred incident to transportation on land. Similarly, one is amazed by some of the other interesting figures of 1913 which indicate the deaths that were not prevented by surgical attention, although undoubtedly given to the victims as rapidly as possible.

In 1913, there were 9,988 successful suicides in the registration area, 4,935 deaths from burns, conflagrations excepted, 4,567 deaths from homicide. With such figures of mortality from preventable causes, we note in strange contrast, the few deaths from the only actually non-preventable disease, old age, which was responsible for the death of 13,914 persons in 1913.

ORTHOPEDIC SURGERY.

Diseases of bones and of joints furnish many of the baffling problems of modern medicine. They affect tissues whose histology, physiology, and pathology are almost unopened books. We cannot understand disease in tissues of whose structure and function we are ignorant. Here is a work to fire the imagination of the young. A few years spent in patient investigation may bring more lasting renown than a lifetime of clinical observation.

We have been too ready to draw conclusions without sufficient foundation of fact. One of the great needs in orthopedic surgery is the accumulation of solid facts.—LEONARD W. ELY in *The J. A. M. A.*

Book Reviews

Lectures on the Heart. By THOMAS LEWIS, M. D., F. R. C. P., D. Sc., Physician, City of London Hospital; Assistant Physician and Lecturer in Cardiac Pathology, University College Hospital, London. Duodecimo; 124 pages; 83 illustrations. New York: PAUL B. HOEBER, 1915. \$2.00.

These lectures were delivered in America last October and are entitled: The Excitation Wave of the Heart; The Method of Electrocardiography Exemplified; The Relation of Auricular Systole to Heart Sounds and Murmurs; Observations Upon Dyspnea, with Especial Reference to Acidosis; and Observations Upon Cardiac Syncope. In the first lecture, the Excitation Wave, the electrical waves of the heart are expounded, and the method of their measurement is described. The second lecture on Electrocardiography describes the interpretation of electrocardiographic readings of the normal heart and of the commonest abnormal conditions. The third lecture, on the Relation of Auricular Systole to Heart Sounds and Murmurs, opens an entirely novel field. Lewis is now enabled to graphically reproduce heart sounds as accurately as the electrical wave, and arrives at some highly interesting observations concerning the relation of the auricular systole to heart sounds and murmurs. The fourth lecture, upon Dyspnea, also opens a promising field in cardiac physiology. This work is based upon the interesting observation of Bancroft, a pupil of Lewis, who has shown that the dyspnea in certain cases of cardiac disease is due to the presence of non-volatile acids in the blood. By a chemical examination of the blood, Bancroft is able to calculate with a remarkable degree of accuracy the presence and degree of dyspnea of the affected patient. This observation also explains the strange disproportion between the cyanosis and breathlessness in given cases. This study, it seems to us, will prove of wide clinical applicability. In the last lecture, Observations Upon Cardiac Syncope, Lewis demonstrates the clinical and electrocardiographic phenomena of syncope in the various forms of heart maladies.

The lectures demonstrate superlatively the advantages of a close association between clinical and laboratory methods.

Books Received.

John Shaw Billings. A Memoir. By FIELDING H. GARRISON, M.D.; Octavo; 432 pages; illustrated. New York: G. P. PUTNAM'S SONS (The Knickerbocker Press), 1915.

A Practical Handbook of Surgical After-Treatment. By ALAN H. TODD, B.Sc., M.S., London; F.R.C.S., England, Surgical Registrar and Tutor, Guy's Hospital. Duodecimo; 256 pages; 37 illustrations. New York: LONGMANS, GREEN & Co., 1915.

The Origin and Nature of the Emotions and Miscellaneous Papers. By GEORGE W. CRILE, M.D., Professor of Surgery, Western Reserve University, Cleveland. Octavo; 240 pages; 76 illustrations. Philadelphia and London: W. B. SAUNDERS & Co., 1915. \$3.00 net.

Fewer and Better Babies, or the Limitation of Offspring by the Prevention of Conception. By WILLIAM J. ROBINSON, M. D., Editor of *The Critic and Guide* and of *The American Journal of Urology*, author of "Never Told Tales," "Practical Eugenics," etc. With an Introduction by A. JACOB, M.D., LL.D. Duodecimo; 245 pages. New York: THE CRITIC AND GUIDE Co., 1915.

Progress in Surgery

A Résumé of Recent Literature.

Procedures Following Nephrectomy. WM. J. MAYO, Rochester, Minn., *Journal American Medical Association*, March 20, 1915.

Certain procedures to meet accidents and special conditions following nephrectomy are discussed by Mayo. The third portion of the duodenum may be injured and he has reported such cases before. This is most likely to occur in attempting to secure the pedicle for the purpose of ligation, especially when it is greatly infiltrated by inflammation and fixed in close relationship with the duodenum. Under such circumstances, the pedicle may slip from the retaining forceps, and efforts to grasp with toothed forceps the bleeding wounds may result in a duodenal injury, and perforation from necrosis may follow. As soon as the diagnosis of this is established, Mayo advises opening the abdominal cavity through the anterior wall, incising the peritoneum to the right of the curve of the duodenum, elevating the duodenum itself from its peritoneal bed at its outer side, and closing the opening directly by suture. Mayo also recommends the two-forceps method for the ligation of vascular pedicles, with special reference to nephrectomy. A deeply placed pedicle occasionally slips out of the grasp of the ligature, and this is especially true of the pedicle of the kidney, if a single clamp is used. Reaching in and grasping the vessel in a slipped pedicle is dangerous. Such vessels can be easily caught and held with fingers, guided by the spurt of blood, and then the forceps can be applied with care. If the two-clamp method is used, slipping of the pedicle should not occur. The kidney is first exposed through an appropriate incision. The peritoneal fat is separated, the ureter divided between ligatures, and the ends separated. Forceps should not be left on the part to be removed with the kidney, which should be dissected well up to the pelvis, so that it be not tied into the vascular pedicle. The pedicle is exposed by careful removal of the fat, and, if possible, the vessels ligated separately; but if the pedicle is thick and deeply placed, or the operation is a subcapsular nephrectomy, two forceps are placed on the proximal side, if possible, about three-quarters of an inch apart, and the kidney cut away. A ligature is then put around the pedicle beneath the deeper pair of forceps, and slipped into the groove made by the forceps as they are removed, and tied; while the pedicle itself is still safely retained in the distal forceps. A second ligature can then be placed, and the distal forceps removed, if the knot is pulled tight. The two-forceps method is specially applicable in nephrectomy and splenectomy; and in the latter case, care should be taken that the tail of the pancreas does not extend up into the hilum of the spleen. If so, it should be dissected out before the clamps are replaced. Mayo has succeeded in using the two-forceps method on the renal pedicle; but in some other situations, only a single pair can be applied to a pedicle and that not always satisfactorily. In such a case, it is necessary to use a ligature on a needle, which, threaded, is passed through about one-fourth of the diameter of the pedicle; then with a single knot, the tissues are brought sufficiently tight under the end of the forceps to secure a good hold. The ligature is then brought around the opposite side of the pedicle and a single knot made; the forceps are slowly loosened, and the ligature pulled home; both sides of the pedicle are thus drawn tight, and the ligature cannot slip. This method is credited to Professor Graser of Erlangen. Other special directions are given for large tumors, for which an anterior transperitoneal incision is preferable over a retroperitoneal lateral, especially for malignant disease. It permits careful examination of the growth, the liver and the abdominal contents, and shows any metastases present. The lungs should always be roentgenographed, to determine metastases. In malignant renal growths, if the tumor is removed, the ureter should be located at once, divided, and the end sterilized well below the growth to avoid getting infected material into the lower portion. The upper end of the ureter is dissected

up through the pelvis, and the renal vessels secured at their origin before any attempt is made to remove the growth; otherwise polypoid projections from the growth in the renal vein may be forced into the vena cava. In Mayo's experience, less than five per cent. of the ureters in tuberculosis of the kidney require removal, and usually only when a stricture exists down close to the bladder. If the kidney is changed to a closed sac, the ureter will often be found obliterated just below the pelvis, and ligation and sterilization disposes of it. In the "pipe-stem" ureters, and all with lumen free from mixed infection, injecting 5 to 10 minims of a 95 per cent. solution of phenol into the ureter with ligation insures against further trouble. In these two types of cases, the nephrectomy wound should not be drained, on account of the danger of secondary infection of the ureteral stump. To put it broadly, in all tuberculous kidneys, which have become closed sacs and lost their function, the ureter may be sterilized and dropped in the wound, which is closed without draining. "When there is secretion of urine and especially when there is a mixed infection present, if the ureter be tied and dropped into the wound it will occasionally cause wound infection and sinus formation. If the other kidney be involved, the patient may eventually die from phenomena having their origin in the infection. In these cases the stump of the ureter should be attached to the skin at the anterior extremity of the incision and should not be dropped into the wound. When so attached it permits the safe escape of discharging fluids. This is especially true in recent involvement of the kidney when there is considerable functioning renal tissue. The rule should be that when the kidney removed for tuberculosis is still secreting urine, if there is any evidence of mixed infection, the better practice is to attach the stump to the skin to prevent the possibility of wound infection with tuberculosis and sepsis. In just such cases the ureter will be found enlarged and softened but not shortened or rigid."

Hematogenous Infections of the Kidney. G. E. BREWER, New York, *New York Medical Journal*, March 20, 1915.

"From a study of the experimental data here recorded, the results obtained by other investigators, and the accumulated clinical experience of the past two decades, we may conclude, first, that during the progress of any acute infectious disease a certain number of microorganisms find their way into the blood current, and that many of these organisms are excreted through the kidneys. If the number of these organisms is comparatively small, if their virulence is low, and if the kidneys are in a healthy condition, the transit of the organisms through the renal apparatus gives rise to no demonstrable lesion. If, on the other hand, the number of organisms is large, if their virulence is high, or if one or both kidneys are diseased, lesions are produced which have been described above, and which may at the outset produce an overwhelming and fatal toxemia, or may proceed more slowly to the development of any of the classical types of renal infection or suppuration; second, that while the disease may be bilateral, in a large number of instances it is unilateral, and that its unilateral character is due to the fact that the affected kidney has lost to some extent its normal resistance to infection by trauma, abnormal mobility, previous disease, calculus irritation, anemia, passive hyperemia, complete, incomplete, or intermittent hydronephrosis; third, that the presence in the body of a kidney damaged by trauma or disease to such an extent as to lower its normal resistance to infection is a distinct menace to the individual, in that it possesses a potential susceptibility to even the mildest forms of blood infection; fourth, that while I have been able to produce these lesions in animals by bacillus coli, streptococcus pyogenes, staphylococcus pyogenes aureus, bacillus typhosus, the pneumococcus, and the pyocyaneus, in clinical cases, I have only been able to isolate the first four of these organisms. It may be added, however, that in the number of clinical cases the results of my bacterial investigations have been negative, notably in one instance in which the disease was known to be sequel of scarlet fever.

"From my experimental studies I have been impressed

with the great difficulty in producing in animals an ascending nephritis, which is in marked contrast to the ease with which it is possible to induce a hematogenous infection. This would seem to corroborate my impression, derived from clinical observation, that hematogenous infection was responsible for the greater number of cases of renal sepsis, and would tend to establish the fact to which Israel and others have already called attention, that even in septic conditions of the lower urinary passages the concomitant renal lesion may be of hematogenous origin."

Epididymectomy for Acute Epididymitis, as an Out-Patient Procedure. A. H. CROSBIE and A. RILEY, Boston. *Boston Medical and Surgical Journal*, May 6, 1915.

Finding palliative treatment unsatisfactory in acute epididymitis, Crosbie and Riley tried epididymectomy, and with gratifying results; 20 to 30 cc. of 1 per cent. novocaine solution is infiltrated into the cord and the inguinal canal, the needle reaching the globus major; the scrotum is anesthetized all the way to the perineum on the side to be operated. After waiting fifteen minutes a lateral incision is made so that the tunica vaginalis is opened near the epididymis. Hydrocele fluid is liberated, as a rule, and adhesions bluntly divided, so that the testis and epididymis are delivered through the incision. The indurated zones in the epididymis are punctured with a tenotome whether pus be visible or not. The organ is washed off with saline solution, a rubber drain is inserted along the length of the epididymis and brought out at the lowermost angle of the incision, and the edges of the wound are loosely approximated with silkworm catgut.

The advantages of epididymectomy are: (1) relief follows promptly and is permanent; (2) the course of the disease is shortened, as is also the urethritis; (3) the danger of subsequent sterility is reduced; the operation is simple and can be properly done in an out-patient clinic.

Fulguration Treatment of Tumors of the Bladder. H. L. KRETSCHMER, Chicago. *Journal American Medical Association*, March 27, 1915.

Kretschmer describes the fulguration treatment of bladder tumors started by Beer nearly five years ago. It has been so uniformly successful that modern urinary surgery, he says, absolutely demands this form of treatment in these types of tumors. Though not so universally employed in Europe as in this country, it is gaining in favor there, and it is safe to assume that it will soon become as popular as it is here. The term fulguration has been objected to and Thomas prefers the term "high frequency dessication," while various other terms have been used by different authors. It was early recognized by Beer that a careful selection of cases was necessary and malignant cases excluded. It may not be possible always to determine the character of the tumor, however, and the removal of a fragment for histologic examination has been condemned as absolutely dangerous by many. It does not follow that because a tumor does not yield to treatment it must necessarily be malignant. The best results have been obtained in papillomas that have been previously operated on, that is in cases with recurrence. These, however, may not always be true recurrences. The possibility of overlooking small tumors must be considered. The technic is described by Kretschmer as follows: "The patient is prepared for cystoscopic examination. The bladder is distended with boric solution. A ureteral catheterizing cystoscope is passed in the bladder, and a fulguration catheter is introduced through the catheter channel into the bladder. The tumor, or one of the tumors, if there are multiple growths, is located and the catheter passed forward to the tumor. The method of applying the current is variable. Some plunge the wire directly into the substance of the tumor, while others prefer to leave a small gap between the end of the wire and the growth. I have worked both ways and it does not seem to make much difference in the results. Two types of current have been employed, the unipolar or Oudin, and the bipolar or D'Arsonval. If the bipolar current is used, one pole is connected with the fulguration catheter and

the other terminates in an electrode, the placing of which depends on the location of the tumor. If the tumor occupies the base of the bladder, a large flat plate may be placed under the buttocks, or an electrode may be placed in the rectum, whereas, if it occupies the upper wall of the bladder, a large flat plate is placed over the suprapubic area. I have always used the portable apparatus made by Wappler, and it has given very satisfactory results." In small growths, the fulgurations should begin at the periphery, but in larger ones it might be advisable to apply the current directly to the pedicle, if possible, which is not always the case. The pain experienced by the patient is almost entirely in the cystoscopy, though it is frequently complained of when fulgurating the base, or when the cable touches the mucous membrane of the bladder. The duration varies and the number of applications depends on this. Kretschmer has not found a single untoward result recorded in the literature from this treatment, which frequently acts as a permanent hemostatic in bleeding cases. Small pieces of tissue may adhere to the fulguration catheter, interrupting the treatment. A local reaction follows, depending in part on the intensity and duration of the treatment, which has been in some cases mistaken for carcinoma.

Ureteral Calculi; Special Means of Diagnosis and Newer Methods of Intravesical Treatment. J. T. GERAGHTY and FRANK HENMAN, Baltimore. *Surgery, Gynecology and Obstetrics*, May, 1915.

Only in rare instances can the presence or position of ureteral calculi be definitely determined by the symptoms which are rarely of diagnostic aid. Even radiography fails in a large percentage of cases. Occasionally collargol ureterograms will be of service where the roentgenograms will fail. Wax-tipped catheters are the best means for detecting ureteral calculi and succeed in helping to make the diagnosis when skiagraphs have failed. A considerable percentage of stones which enter the ureter pass spontaneously, and unless the calculus blocks the ureter or produces repeated and violent colic, simple manipulative methods should first be employed rather than operative measures. When calculi lie beyond the juxta-vesical portion, displacement with the ureteral catheter, injection of oil or securing relaxation of the ureteral wall by use of the thermocatheter, may bring about the expulsion of the stone. If it lies in the vesical portion of the ureter, cystoscopic procedures should usually be successful.

Anuria Due to Unilateral Calculous Obstruction. LOUIS FRANK, Louisville. *Surgery, Gynecology and Obstetrics*, May, 1915.

Frank reports five cases of this character. The diagnosis must exclude other causes of suppression; the attacks come on suddenly and an important feature in anuria of this kind is the absolute absence of any disturbance aside from the lack of urinary secretion. A history of previous attacks of calculous colic often exists. Operation measures, quickly and expeditiously carried out, are necessary.

A Case of Multiple Pulsating Tumors Secondary to Hypernephroma. F. TAYLOR, London, *Lancet*, March 6, 1915.

A man, aged 59, presented four tumors of the bones, in the elbow, shoulder and both buttocks, all of which pulsated and gave a distinct bruit. In addition the patient had hematuria, but no tumor of the kidney was palpable. The patient died eight months later. At autopsy the masses proved to be hypernephromata secondary to a tumor in the left kidney. Taylor emphasizes the frequency of bone metastases with hypernephroma of the kidney, and the fact that such metastases often pulsate.

A Simplified Technique for Suprapubic Prostatectomy. A. J. MCKINNON, Lincoln, Nebraska. *The Urologic and Cutaneous Review*, April, 1915.

McKinnon eliminates washing out the bladder before and after operating; he omits stitching the bladder to the abdominal wall. He makes a small incision through

skin and fascia, separates muscles bluntly, pulls up perivesical fat and peritoneum with the finger. The bladder is punctured through its apex. The left index finger is introduced into the wound down to prostatic urethra. A finger of right hand is placed in the rectum and the prostate is enucleated; iodoform gauze is led into the prostatic cavity.

By these steps prostatectomy is made as simple a procedure as is possible. Making the bladder opening high up does away with the possibility for fistula; the iodoform packing acts as an effectual drain and produces hemostasis.

Operative Treatment of Retroversion of the Uterus. *Surgery, Gynecology and Obstetrics*, May, 1915.

At a meeting of the Philadelphia Medical Society last December, this topic was discussed by a number of the leading gynecological operators. Clark (Philadelphia) favors the Coffey operation, Kelly (Baltimore) now performs a modification of his original suspension procedure. Hirst (Philadelphia) prefers the Alexander operation through a Pfannenstiel incision giving access to the appendages and the appendix, at the same time combining the procedure with a temporary suspension of the uterus. Cragin (New York) is performing a Gilliam operation through the transverse incision. Bovée (Washington) favors the round ligament operations combined with other measures necessary in each case. Gilliam (Columbus) defends the operation known by his name. Webster (Chicago) advocates the Webster-Baldy procedure. Montgomery (Philadelphia) opens the abdomen and uses the round ligaments and the peritoneum, while Baldy (Philadelphia), favoring his own operation, states that there must be virtue in all of the procedures to warrant their continued use by experienced surgeons.

Treatment of Placenta Previa. JOHN F. WINN, Richmond. *American Journal of Obstetrics*, April, 1915.

The author believes that when the child is viable, dilatation with the rubber bag and podalic version give best results for mother and child. When the child's life can no longer be considered, version offers the best result for the mother, slow extraction being essential. For marginal and lateral varieties of the condition, puncture of the membranes seems to be the only necessary procedure. Caesarian section should be limited to cases of almost complete previa with profuse hemorrhage, the child probably weakened yet offering reasonable prospects of being saved, the cervix undilated or rigid.

The Significance of Uterine Hemorrhage. H. WELLINGTON YATES, Detroit. *American Journal of Obstetrics*, April, 1915.

Yates contends that all unusual uterine or supposed menstrual bleedings should call for keenest observation as the diagnosis of cancer is not as readily made as it should be even by physicians. All curettings should be examined. There is no "cancer age," many cases occurring in young women. The microscope can be dispensed with only when there is a protruding, undoubtedly carcinomatous mass or when digital exploration furnishes conclusive evidence of malignancy.

On the Occurrence of a Nine-Millimeter Human Embryo in the Margin of a Full-Term Placenta. ROY L. MOODIE, Chicago. *Surgery, Gynecology and Obstetrics*, May, 1915.

This remarkable instance has been thoroughly studied by Moodie, who gives the possible interpretations of the finding of a few weeks' old embryo at the margin of a placenta at full-term. The questions of parthenogenesis, of fertilized polar bodies, of twins—one small, due to inanition—of an embryoma and of superfetation are considered. [There is also the possibility of a missed abortion, the fetus having been kept from degenerating by absorption of the surrounding fluids.—Ed.]

Pylephlebitis Complicating Appendicitis. EDMUND ADAM BABLER, St. Louis. *Annals of Surgery*, May, 1915.

Except for perforative peritonitis Babler believes that the gravest present day complication of appendicitis is

pylephlebitis with multiple abscesses of the liver or of the lung. Pylephlebitis is less rare than is supposed. Many patients die or recover where the condition was unrecognized.

Multiple abscesses of the liver produce distinct chills, followed by high temperatures with profuse sweating; there is also urobilin in the urine and persistent icterus. Locally there is pain, often severe; the liver dullness is increased; there may be local edema. For the diagnosis of multiple liver abscesses, in addition to these symptoms, the most important clue lies in the recognition of the causative appendicitis. Prophylaxis, therefore, is all important. Remove the appendix just as soon as the diagnosis of appendicitis is made. Where there have been chills, explore the lymphatic draining areas from the appendix region and drain thoroughly. When liver abscesses have formed, the intense pain frequently guides the surgeon to their site. For these Babler drains through the lumbar region. His final caution is not to aspirate the liver until it has been well exposed, unless preparations for immediate operation have been completed.

The Pathogenesis of Umbilical Hernia. ALEXIS V. MOSCHCOWITZ, New York. *Annals of Surgery*, May, 1915.

Moschcowitz, in a carefully considered study, shows that the same factors which operate in the pathogenesis of inguinal and femoral hernial function, also, for umbilical hernia. These factors are the transversalis fascia and the bloodvessels which pierce it. The structures which enter into the umbilical ring are the right and left umbilical arteries below, with the urachus and the umbilical vein above; also the transversalis fascia here thickened to form the so-called Richet's fascia—each of these structures presents, theoretically, a point for hernial formation. In reality, however, the most frequent variety of umbilical hernia makes its way through the opening in the transversalis fascia (here Richet's fascia) for the umbilical vein. This is so because at the birth of the child ligation of its cord produces a firm fibrosis of the two umbilical arteries and urachus to the anterior abdominal wall and thereby reduces to a minimum the likelihood for hernia at this point. The umbilical vein, on the other hand, is deficient in strong connective tissue formation and, moreover, leaves unprotected a portion of the linea alba, since the vein is pulled away from the upper margin of the ring by its attachment to the two arteries and urachus. Umbilical hernial protrusions, therefore, take place, as a rule, via the umbilical vein opening.

Congenital Intestinal Obstruction. V. C. ROWLAND, Cleveland. *American Journal of Diseases of Children*, May, 1915.

Rowland describes a very unusual condition,—a congenital mechanical obstruction of the bowels not due to a developmental defect, in an infant five days old. The child exhibited the usual signs of intestinal obstruction and was therefore operated upon. At operation there was found a complete twist of the mesentery of the small intestine with complete obstruction at about the middle of the small gut. On untwisting the volvulus, gas and feces passed through the intestine, but in spite of the relief of the obstruction the child died the following day.

The author believes the case is important because it shows that although the great majority of congenital obstruction cases are due to development defect and therefore usually incurable, there are rarely cases such as this in which a condition exists that is easily remediable at operation.

Megacolon and Microcolon. LANGLEY PORTER and ALAN-SON WEEKS, San Francisco. *American Journal of Diseases of Children*, April, 1915.

After summarizing the views of some of the previous investigators of megacolon, the authors describe in detail four cases of this anomaly and add a case of microcolon. They believe with Barrington-Ward that megacolon is a congenital abnormality in the lower end of the hind gut which takes the form of a muscular hyperplasia. It usually involves the rectum and spreads a vary-

ing distance up the pelvic and iliac colon. The whole hind gut or only a localized portion may be involved. The hyperplasia of the muscle gives rise both to thickening of the walls and to increase of bowel lumen. The result is poor function with resulting stasis and then hypertrophy and dilatation above the original lesion.

These cases are characterized by obstinate constipation, great abdominal enlargement, visible peristalsis and constitutional results from absorption of toxic retained products.

The authors believe that mild types of this malady occur, and that the obstinately constipated infants, who while not rachitic, nevertheless present large bulging abdomens, probably belong to this group of diseases. Hertz has called attention to the fact that these children show very large redundant sigmoides on x-ray examination.

The diagnosis of the condition is not difficult. Tuberculous peritonitis in older infants and multiple stenoses in the younger may cause confusion. Bimanual rectal examination is of great aid, especially if made with the child under anesthesia.

In severe cases operation must be resorted to,—colotomy, excision of the colon, and anastomosis have been advised.

Shoulder Disability; A Further Study of its Varieties and Their Treatment. WALTER M. BRICKNER, New York *Interstate Medical Journal*, April, 1915.

Brickner classifies the causes of shoulder disability (a term which he prefers to "stiff and painful shoulder," because the stiffness often exists without the pain, and vice versa) under the following heads:

1. Subacromial bursitis.
2. Subacromial bursitis with injury to the supraspinatus or, occasionally, the infraspinatus tendon, and calcareous deposit.
3. Spinatus tendon injury with slight or perhaps no associated bursitis.
4. Fracture of the greater tuberosity of the humerus.
5. Subluxation (forward) of the humerus.
6. Spontaneously reduced dislocation; with which, of course, may be grouped disability following surgically reduced dislocation.
7. Sprain or tear of the capsule without dislocation.
8. Subcoracoid bursitis.
9. Biceps tendovaginitis.
10. Traumatic periostitis.
11. Developing syphilis, tuberculosis and neoplasm of the head of the humerus.
12. True brachial neuritis.
13. Unclassifiable cases, most of which probably belong to one or another of the above groups, but some of which perhaps remain to be accounted for otherwise.

An article fully describing 1, 2 and 3 appeared in the March issue of the *American Journal of the Medical Sciences*, and was abstracted in the April issue of the *JOURNAL*. For a description of 5, see the *JOURNAL*, February, 1915, page 50.

Four (4), fracture of the greater tuberosity of the humerus, when mild and resulting from internal violence, can be diagnosed only by the roentgenogram; when of considerable extent and due to external violence it may be recognized by local pain, tenderness, swelling and ecchymosis. Fixation of the arm in moderate abduction for two or three weeks, interrupted at intervals for passive movements and massage, and followed by graduated movements to prevent stiffness, will bring about good results. In 6, the essential point is to prevent stiffness, and this can be accomplished by the same means as in fracture of the tuberosity. We find, in 7, fresh cases where there is tenderness about the joint, slight swelling, pain, and limitation of movement, and old cases which are diagnosed principally by elimination. Here, again, abduction is the most effective and speedy remedy. More uncommon than the others is 8, in which the most characteristic pain and disability is in drawing the arm forward; iodine, aspirin, and resting the arm in a sling bring relief. The characteristics of 9 are tenderness in the bicipital groove, pain on strongly flexing the forearm, and pain when the arm is swung back and forth. Treatment is by local rest and anodynes. For 11, see the *JOURNAL*, May, 1913. Although

rare, 12 is so often mistakenly given for the cause of shoulder disability that it was thought well to include it in the list. Here we find tenderness of the nerves in the neck, the coracoid region and the arm, and, when long established, objective motor and sensory symptoms.

For the method of abduction referred to as treatment in many cases of shoulder disability, see the *JOURNAL*, February, 1915, p. 71.

An Undescribed Ulnar Nerve Trouble, Due to Tension from Scar and Its Cure. F. J. COTTON, Boston *Boston Medical and Surgical Journal*, April 1, 1915.

Cotton describes seven cases. In all instances there was a history of injury of the elbow; in two there had been a fracture. The symptoms include pain, numbness in the ulnar nerve distribution, and partial paresis with atrophy of the muscles. "The mechanism is a fixation of the nerve by scar tissue, in the epitrochlear groove, or in the niche next below this point." The relief is surgical. In most of the cases Cotton released the nerve from the scar tissue, replaced it slightly forward, imbedded it in a mass of fat, and stitched it in place. The relief in most instances was rapid and in all cases complete.

The Weight-Bearing Properties of Amputation Stumps. (Ueber die Tragfähigkeit des Amputationsstumpfes.) J. BALLNER, Vienna *Wiener Klinische Wochenschrift*, March 18, 1915.

The osteoplastic methods of Bier, Pirogoff and Gritti give excellent results, but are technically difficult of execution. Nevertheless, when the conditions are favorable, these operations are recommended. Ballner, however, commends the apertosteal method of Bunze as the most widely applicable and feasible. This method affords a painless stump and can be carried out even when primary union is not obtainable.

Subpectoral Abscess With Report of Two Cases. D. RIESMAN, Philadelphia *New York Medical Journal*, April 3, 1915.

Riesman reports two cases of this rather rare malady. The first symptom of subpectoral abscess is usually a sudden, intense, agonizing pain in the infraclavicular region, increased by breathing and especially by motions of the arm. The temperature is high from the beginning—fever may even precede the onset of the pain—and prostration is marked. There is nothing to indicate the exact nature of the trouble, and the physician will think that the case is one of brachial neuritis, pneumonia, or pleurisy. On examination there is tenderness in the pectoral region in the second or third intercostal spaces. As time progresses the pain does not abate much, but rather increases, although tenderness to touch may not be marked. Palpation gives a sense of very deep fluctuation, which is so elusive that when different men examine the patient simultaneously they are apt to disagree about it. Coincident with the appearance of this deep-seated fluctuation, the whole pectoral region becomes brawny and tense from the clavicle downward and outward toward the axillary fold. There was no enlargement of the axillary glands in either case. The fever is irregular and tends to be high throughout. The pulse is rapid, the face flushed. Delirium is present, chiefly nocturnal, sometimes diurnal, and the urine shows a high degree of toxic albuminuria. The leucocytes are considerably increased, especially the polymorphonuclear cells.

In one case, a small patch of pneumonia became evident toward the end of the first week. In both cases, the streptococcus was found in the pus. Riesman believes that early incision is better than waiting for fluctuation to appear.

The Treatment of Rheumatoid Arthritis of the Hypertrophic Type. JOHN L. PORTER, Chicago, *American Journal of Orthopedic Surgery*, April, 1915.

Porter found that in osteoarthritis he obtained best results when in addition to immobilization he injected into the involved joint a 3 per cent. formalin solution in glycerine. Subsequently he substituted olive oil for the

glycerine and used only 2 per cent. formalin; this reduced the pain following injection. His method is as follows:

1. Five minutes before the injection the patient receives one-fourth grain morphia with atropin.
2. The site for injection is infiltrated with novocaine.
3. Two per cent. formalin in olive oil is injected until the patient begins to feel the joint becoming distended.
4. The joint is immediately immobilized in a plaster cast. The cast is removed in two to four weeks.

Porter admits this procedure is empirical, but he is convinced of its efficacy.

Statistical Remarks on Tetanus. M. Bazy, *Medical Press and Circular*, March 31, 1915.

The statistics obtained in the intrenched camp around Paris embrace 10,346 wounded of whom 129 developed tetanus, i. e., 1.134 per cent. Of these 129 cases 90 proved fatal,—70 per cent. The statistics show the following:

(1) That tetanus may make its appearance a long time after the receipt of the injury,—as long as twenty-seven days. Even in these cases antitoxin should be administered.

(2) The greatest number of cases developed between six and eight days after the wound was received.

(3) Tetanus was particularly frequent in certain localities.

(4) Anti-tetanic serum is of great benefit. In hospitals where it is used as a routine measure in all wounds the proportion of tetanus cases is reduced to 0.418 per cent. In hospitals where it is given only in suspicious cases the rate is 1.279 per cent. In one group of 200 wounded, only one hundred had a preventive injection. Of the injected cases, one developed tetanus, and that on the day following the injection, so that the injection could be called prophylactic in name only. Of the uninjected cases 12 (i. e., 18 per cent.) developed tetanus. Every wounded soldier should be injected whether the wound be by bullet or by shell. If the supply runs short, it had better be reserved for shell wounds, but economy may be realized by the use of smaller quantities at each injection.

Chronic Tetanus with Relapse Caused by the Persistence of a Splinter of Projectile in Wound. R. AUBOYER, Orleans, France. *Paris Medical*, April 10, 1915.

A soldier received a wound in the shoulder, a piece of shrapnel, remaining embedded deep in the tissues. Owing to the apparently little harm caused by the splinter and the difficulty attending its extraction, it was left in place. Thirteen days later the patient developed trismus and rapidly passed into a condition of severe tetanus. After six weeks the condition improved and the wound healed. The fragment of shell was not removed as it apparently caused no disturbance of function. One month later after a period of apparent recovery, a second attack of tetanus recurred. The patient was thereupon put under an anesthetic and after considerable difficulty the shell fragment was recovered. A complete recovery followed.

The author draws the following conclusions: A wide opening of wounds infected by projectiles and the extraction of fragments as soon as possible is imperative. This is the best preventive treatment of tetanus. In spite of these precautions, a prophylactic serum injection should be given. This should be repeated every eight to fifteen days, as the antitoxin is rapidly eliminated.

Gunshot Wounds of the Spine. O. MARBURG and EGON RANZI, Vienna. *Wiener Klinische Wochenschrift*, February 4, 1915.

In contra-distinction to gunshot wounds of the head, Marburg and Ranzi advise waiting before operation is done, until the condition is quiescent. If after four or five weeks there is no clinical change, laminectomy is indicated. The operation is contra-indicated when there are pulmonary or abdominal complications; when the wound is purulent, and when there is a purulent cystitis with ascending pyelitis. This report is based upon the study of 35 cases.

The Exploratory Opening of the Sphenoid Sinus. CHARLES P. GRAYSON. *The Laryngoscope*, Vol. XXV, No. 1, 1915.

Grayson advocates the making of an artificial opening in the anterior wall of the sphenoid, according to the following technic: the inner or nasal portion of the anterior surface of the sphenoid is exposed as widely as possible by shrinking the tissues around it with cocaine and adrenalin. When this has been done the course of the sphenopalatine artery is usually so distinctly visible that it can be readily avoided. The application of dilute tincture of iodine suffices for sterilization. Grayson perforates the sinus wall with a straight drill, which has a conical burr tip measuring six mm. in length and two and one-half mm. from its point to its greatest diameter. The point of interference is two or three mm. above the line which divides the anterior from the inferior surface of the sphenoid body and close to the attachment of the ethmoid plate in the middle line. The opening that is made is two mm. in diameter.

Angioma of the Uvula. MAX A. GOLDSTEIN. *The Laryngoscope*, Vol. XXV, No. 1, 1915.

About two years before examination the patient felt a roughness of the throat near the base of the tongue. Later there seemed some difficulty in free nasal respiration. Later deglutition was impaired. At the time of examination a definite tumor of the uvula could be seen which was large enough to impair speech, to cause frequent regurgitation of fluids through the nose, and to cause a constant, short cough.

The tumor was removed under local anesthesia. An eight-inch, widely curved, uterine forceps was clamped well above the vessels, a large aneurysm needle threaded with strong silk was passed from behind through the palate and two ligatures firmly tied on each side. Then the tumor was excised.

Tumors of the Uvula, with Report of a Case of Papilloma of the Uvula. P. SAMUEL STOUT. *The Laryngoscope*, Vol. XXV, No. 1, 1915.

Stout gives a résumé and reports a case of papilloma of the uvula in a girl of fourteen. About five months before examination she noticed a movable mass in her throat which on coughing would fly out and strike her front teeth. It hung to the end of a very long uvula, and was as large as an almond. It was easily removed under local anesthesia and proved to be a papilloma.

Cavernous Angioma of the Tongue. H. ARROWSMITH. *The Laryngoscope*, Vol. XXV, No. 1, 1915.

The case occurred in a girl of twelve, who from birth had a tumor occupying the middle third of the left half of the tongue. It could be emptied by pressure and remained flaccid as long as the blood supply was shut off. The patient was operated on under colonic anesthesia. A deep silk suture was passed through the left half of the tongue behind the swelling, and four similar sutures surrounded the tumor, which were not tied until the tumor was dissected out.

Empyema of the Thorax. ABRAHAM O. WILENSKY, New York. *Surgery, Gynecology and Obstetrics*, May, 1915.

Wilensky has critically studied 299 cases of acute empyema of the thorax occurring in the last ten years at Mt. Sinai Hospital. In the vast majority of the cases it is secondary to some other inflammatory lesion in the body. The average mortality was 28 per cent., varying from 50 per cent. in infants to 18 per cent. in adults. Children between 3 and 10 years of age showed the lowest mortality. Of the patients who recovered, 23 per cent. had more or less trouble with the healing of their wounds but Wilensky hopes that an improved technic will diminish or altogether eliminate sinuses. The pneumococcus and streptococcus were most frequently found. Blood cultures were usually negative except in the presence of complications (arthritis or osteomyelitis) or as an ante-mortem invasion.

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MODERN ASPECTS OF THE PROBLEM OF NEOPLASIA.

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(From Columbia University, George Crocker Special Research Fund, F. C. Wood, Director.)

The mountain of cancer has labored and brought forth a mouse, said Roger Williams some few years ago. Hardly to be justified then in view of the amount of information that had already accumulated through the investigation of new growths of the mouse and rat, such pessimism is even less warranted now, at a time when transplantable neoplasms from still other species are available for research; furthermore, the biological method of approaching the question has been in use for hardly more than two decades. True, the clinician has always been an eager student of the biology (clinical behavior) of tumors, but his activities have necessarily been hampered by the fact that his primary duty has been always to heal rather than to investigate, to remove the tumor rather than to experiment with it; and although of late years the anatomist, the embryologist, the pathologist, the chemist, the zoologist, the botanist, the physicist, and the statistician have all contributed the most valuable assistance, yet so insoluble is the riddle that it has thus far proved refractory even to concerted effort, as for so many centuries it had been able to resist the attack of the clinician alone.

While it is impossible at present to state definitely just what a tumor is, it can at least be said with a fair amount of certainty what it is not, and even this must be regarded as an encouraging advance, when cognizance is taken of the difficulties with which the problem is beset. A neoplasm can be defined only as a tissue overgrowth which is independent of the laws governing the remainder of the body; further than this it is impossible to go. It cannot be asserted, as was once the custom, that this lawlessly proliferating tissue subserves no useful purpose in the organism, since there is reason to believe that the cells of a tumor involving a gland of internal secretion may continue to elaborate the material characteristic of that organ, and thus prevent the body from being deprived of the secretion

as it would be were the gland in question to undergo destruction by some other disease, for example, tuberculosis. Such a situation is rare, it must be confessed, yet the fact that it can exist at all is sufficient ground for excluding uselessness from the characteristics properly to be embraced in the definition. Neither can it be said that a new growth is always characterized by the atypical arrangement of its cells, since an occasional example, particularly in the thyroid gland or the liver, differs little or not at all in histology from the normal structure in which it originates, betraying a neoplastic nature solely by its clinical behavior.

Continuous growth also must be dismissed from the definition, because a few tumors undergo partial or complete regression, although the great majority of them do, of course, proliferate indefinitely, and because the successful cultivation of normal tissue in cultures outside of the body for a period exceeding two years suggests that this material, too, may be capable of unlimited proliferation under suitable conditions. If the inference be sound, then the faculty of continuous growth is to be regarded as characteristic, not only of neoplasms, but of tissues in general, when the proper environment is furnished.

The optimistic note struck at the outset of this article must not be misinterpreted: nobody believes that the cause and the cure of malignant growths will be discovered this month or this year; far from it. But the large amount of information already gained does encourage the expectation that the problem will not continue indefinitely to elude us, though to-day, it must be confessed, it is possible only to prepare bricks for a structure which it is hoped can some day be erected. A more cheerful outlook is appreciable since it has become possible to study new growths in animals and to transfer them from one to another, since this method of investigation may be relied upon to furnish even more information in the future than it has in the past; it is with this aspect of research that the present article will chiefly concern itself.

Malignant growths have been discovered throughout the animal kingdom as far down as the reptiles, and have been successfully transplanted, beside the

mouse and rat, in dogs, rabbits, and guinea-pigs, while lesions resembling the true tumors in many respects are being studied in the domestic fowl and the trout. The tame mouse and rat have been chosen for investigation principally because of the readiness with which they can be obtained and the facility with which they can be handled, and the fact that the more recent knowledge of cancer depends almost entirely upon observations on these animals must not be taken to imply that the findings would not hold good for malignant growths in other species, were it convenient to inquire into them in the same way.

The most common tumor of the mouse is a hemorrhagic adenocarcinoma which originates in the mammary glands of old females, though almost all the varieties found in the human subject, including sarcoma, have been described. The clinical course of the disease follows closely that which it pursues in man. Thus, these tumors are characterized by metastasis through both blood and lymph channels, infiltrative growth, and recurrence after removal; moreover, death is almost invariably the final outcome of their presence, since less than one per cent. of the spontaneous growths retrogress.

The tumors of animals have provided the pathologist with an ideal means for investigating the parasitic hypothesis. A careful record kept for several years of the many thousands of cancer-bearing mice in Bashford's laboratory in London furnished not the slightest evidence to suggest transfer of the disease from one mouse to another. Again, those tumors that have arisen in the "cancer cages" described from time to time in the literature have occurred generally in old female mice, and have developed in most instances in the mamma; that old animals should have been affected at the site where cancer ordinarily develops suggests that these alleged epidemics were due merely to the sudden outcropping of a number of spontaneous new growths, and makes it quite unnecessary to invoke an infectious etiology, while at the same time it furnishes additional evidence against the existence of so-called "cancer-houses," which are to be discussed in a succeeding paragraph.

The spontaneous tumors of the mouse are transplantable into other mice, it is true, but this fact affords no support to the hypothesis now under consideration, for the transfer is not in any way an infection, but, on the contrary, a genuine transplantation. Within the first few days after its insertion, the graft is penetrated by fibroblasts and blood-vessels from the host in large numbers, and these rapidly replace the old stroma which dies within the first two or three days following transplanta-

tion. The parenchyma, on the contrary, survives, and by the active division of its cells gives rise to the new tumor; there is no evidence that neighboring elements in the host's tissues are converted into cancer cells.

The transplanted tumors thus produced are to be sharply distinguished from spontaneous neoplasms, for the former are composed of cells from a certain animal growing in the body of another, and consequently existing under somewhat adverse conditions; thus, the Jensen mouse carcinoma, which is being propagated to-day in laboratories throughout the entire world, is made up of the descendants of cells from the Copenhagen mouse in which Jensen discovered it more than fifteen years ago. Widely different is the case of a spontaneous neoplasm, the cells of which are situated in an environment much more favorable for their continued proliferation, since they are those of the animal itself in which the tumor originated. One indication of this distinction may be found in the observation that transplanted growths frequently retrogress, whereas among spontaneous tumors of the mouse such an event hardly ever takes place; and the difference is shown again in the readiness with which a spontaneous tumor can be engrafted into the mouse in which it arose, as contrasted with all other mice.

Mice may be immunized against the transplantation of cancer by unsuccessful inoculation of a mouse tumor (for propagation is not invariably successful), or by treatment with normal and intact cells of their own species, but the tissues of an animal itself when reintroduced into its organism have not the power to confer resistance, nor can a mouse bearing a spontaneous tumor be immunized with the tissues of other mice against the inoculation of its own growth into another part of the body. This fact is of extreme practical importance in its bearing upon attempts to circumvent metastasis or recurrence.

When a graft is implanted into an animal which has been made refractory, the penetration of fibroblasts and blood-vessels described in a preceding paragraph does not set in, and the fragment gradually dies from mere inanition; nothing occurs to suggest its destruction by any immune forces similar to those with which we are at present acquainted. But this resistance is directed only against a graft which is in process of establishing itself in a new host, having no inimical effect upon a transplanted tumor that has already gained a foothold, and it would certainly be even less effective against a spontaneous neoplasm; hence, the treatment of malignant new growths in man by means of tissue emulsions, filtrates, and so forth, receives no sup-

port from the experimental work so far accomplished in the laboratory.

When the reports of such therapeutic endeavors are subjected to critical examination it becomes at once apparent that much of the improvement is due to psychic phenomena, affecting both physician and patient. Osler has published an instructive example of how great an influence may be exerted temporarily by the mind, in the case of a patient with gastric carcinoma who gained eighteen pounds in weight after visiting a sanguine consultant and hearing his optimistic diagnosis. The tingling, itching, hyperemia, and other local symptoms advanced with such pathetic regularity as proof of a direct attack upon the tumor by the therapeutic agent in question, are often imaginary, or, as in ulcerated growths, can frequently be referred to elimination of the medicament from the raw surface, as Weil has recently indicated. Furthermore, an air of judicial impartiality is often lacking in these descriptions by reason of an unfortunate tendency to omit exact measurements of the growths, or the results of microscopic examination, or both. Finally, the patients almost invariably die of the tumor.

It is not wise to rely too implicitly upon reputed cures even in the case of transplantable malignant neoplasms in animals, since they vary greatly in their power to grow indefinitely. Many of these carcinomata undergo spontaneous regression after proliferating vigorously for a few weeks, and among transplantable sarcomata such an outcome occurs even more frequently; the tumor known as the Buffalo rat sarcoma, for example, sometimes recedes in every rat, and its average percentage of retrogression is no less than forty.

It was believed until very recently that a tumor could be transplanted only into animals of the species within which it arose—that a mouse tumor, for example, could be successfully engrafted only into mice. Murphy has shown, however, that the resistance which an animal possesses by virtue of its race is in some way connected with its lymphoid system, and that when the activities of these tissues are repressed by exposure to x-rays or by the administration of benzol, the organism becomes receptive to tumors from a strange species. In this way it has been possible to grow mouse sarcomata in rats.

The fowl sarcoma of Rous has proved to be a most interesting growth, though whether it actually merits the term sarcoma remains still to be determined. It possesses the morphological characteristics usually associated with this class of neoplasm, and many of the biological properties of the true tumors, but differs fundamentally from carcinomata

and sarcomata of the mouse and rat in being transmissible by means of a cell-free filtrate. Now the fact that new growths of the mouse and rat can be successfully propagated only through the inoculation of living and intact cells has been one of the most powerful arguments against the parasitic hypothesis of neoplasia in general, and still remains so; for even though the chicken sarcoma should finally prove to be a true tumor and the product of a parasite, Rous himself would probably be the first to discountenance any attempt to extend these findings in explanation of the origin of all tumors, since nothing seems more probable at present than that there is no single etiological factor.

In spite of the many hypotheses that have been advanced to account for the development of neoplasia, there exists almost no exact information regarding this problem; indeed, it is not even definitely known whether, as a group, the new growths have one cause in common, or whether each member of the series has its own determining factor, though it may be said that the latter alternative has much to commend it. Nevertheless, this much, at least, appears clear—that there is some distinct and important connection between tumors and chronic irritation. The effect of a single trauma is not so well understood; the event may, perhaps, lead to the development of a neoplasm, though in many cases there can be little doubt that the association is a coincidence, while in others the injury but serves to direct attention to a neoplasm already present. In the case of chronic irritation, however, the evidence is much more definite. Cancer about the mouth in smokers or in individuals with roughened, carious teeth, x-ray cancers, and those originating in scars or ulcers, spring at once to mind in this connection. That the occurrence of neoplasms in the irritated areas is a matter of pure chance is rendered improbable by the large number of recorded instances, no less than by the observation that tumors are likely to arise in any conceivable region of the body exposed to chronic irritation. Occupations and racial habits together constitute, in reality, an extensive experiment. Thus, epithelioma in the skin overlying the abdomen is very common among the natives of Kashmir, who wear a basket of glowing charcoal under their robes for purposes of warmth, and cancer of the mouth equally common in natives of India and the Philippine Islands who chew betel-nut, the neoplasm developing in the former case just where the effects of the heat are most intense, and in the latter at the site where the betel-nut is retained against the cheek. The importance of these observations lies in the fact that cancer in the locations mentioned is prac-

tically unknown in other races. No less instructive are such occupational neoplasms as carcinoma of the scrotum in chimney-sweeps, tumors of the bladder in those who manufacture anilin dyes, and sarcoma of the finger in needlewomen. Moreover, instances suggesting a relation between chronic irritation and the development of neoplasms are not limited to man alone. In the draught cattle of India, squamous-cell carcinoma is a common lesion at the root of the right horn, by which they are attached to wagons or agricultural implements, but it is never found at the root of the left; while it has been shown that carcinoma in horses occurs most frequently where the bit irritates the corners of the mouth, and subcutaneous fibromata most often at the points of pressure by collars and girths. In dogs, the posterior mammae, those most commonly engorged, are most apt to be attacked; in the cow, carcinoma of the liver, which is not a rare disease, is almost invariably connected with severe biliary cirrhosis due to infection with a parasite.

Hepatic carcinoma in the cow is thus complementary to that type of rectal and vesical cancer which occurs in man in association with infection by the *Bilharzia hematobia*, and the two together show the futility of trying to explain cancer as a disease of civilization. Both organisms, separated as they are in the zoological scale, develop tumors at a point exposed to chronic irritation, and apparently in obedience to a law of wide application, since neoplasia assails the entire animal kingdom at least as far down as the reptiles. It does not attack man because of his civilization, nor does it show any greater preference for cultured than for savage races. It is discovered oftener in highly civilized people because they live to a more advanced age and because they have access to a variety of diagnostic measures denied to the inhabitants of less advanced countries, and not because it occurs more frequently in them. Similarly, cancer does not attack the domestic animals on account of their close association with civilization, sparing wild animals, but develops in the former solely for the reason that they attain higher age periods by reason of man's care, and is discovered in them because they are autopsied with comparative frequency.

Chronic irritation, accordingly, appears to be responsible for the inception of certain neoplasms, yet it cannot be the only factor in their etiology, otherwise every individual subjected to it would develop a tumor. This, of course, is not the case, and other causes must therefore be sought. A second has been discovered by Murray, of London, who has found that the offspring of mice suffering from spontaneous (as distinguished from transplanted) carci-

noma are about twice as likely to develop such a tumor as are mice descended from normal parents and grandparents. This information he would apply to the human subject, however, only with the greatest reservation, since the cancerous ancestry in the mice of this experiment was much more concentrated than ever it would be in the great majority of human beings. Many of the so-called "cancer families" in man can be explained by chance, since there must occur some families in which several members will die of cancer, just as there must be others in which none will perish of this disease. Therefore, while it cannot be denied that there may be found an occasional family with a concentrated cancerous heredity, there is, in general, no occasion for alarm.

But the two causes, chronic irritation and predisposition, are in themselves apparently not sufficient for the inauguration of a neoplasm. A third factor seems to be necessary, and this is age. By far the largest number of tumors, both in man and in the lower animals, affect individuals who have passed middle life, and in the experiments just cited carcinomata did not develop any earlier in the mice of cancerous ancestry than it did in the other group. Still, in many cases it seems to be not the age of the individual himself that is of importance, but the age of the tissue in which the neoplasm originates. This may explain the fact that cancer of the breast, uterus, and gastro-intestinal tract appears with relative frequency early in middle life, cancer of the skin, on the contrary, rarely before sixty or seventy. It is a matter of some clinical interest to observe, in this connection, that carcinoma is by no means so rare in children and young adults as it was formerly supposed to be, and that a proper interpretation of the statistics proves that sarcoma, as well as carcinoma, occurs more frequently in the higher age periods. When carcinomata do occur in young individuals, they usually exhibit extraordinary malignancy, whereas those occurring very late in life are often relatively benign.

No definite proof has ever been offered by human pathology in support of the parasitic origin of neoplasia, the parasites mentioned in a preceding paragraph being regarded merely as the cause of a chronic irritation which, in its turn, gives rise to the tumor. The existence of "cancer villages," "cancer streets," and "cancer houses" together with much of the other evidence so frequently advanced in support of the parasitic hypothesis, must, like the existence of "cancer cages," be viewed with skepticism until more cogent proofs have been adduced to sustain the contention. It can often be shown, for example, that a "cancer village" is one in which

the population is composed largely of individuals in the cancer age, most of the younger ones having migrated to the cities, while those who describe "cancer houses" take no account of the law of chance. As Adami has so well said, in discussing this question: ". . . by the law of chance, just as one individual in a thousand may be of gigantic proportions, so one house in a thousand may show a great excess of cases of cancer—or of twin births—over the ordinary run of houses." Few of the reports describing the transfer of cancer from one person to another (*cancer à deux*) are in any way convincing. If large numbers of individuals could be experimentally engrafted with a neoplasm, as mice are engrafted, a certain proportion might develop tumors: at any rate, a carcinoma sometimes becomes implanted upon an adjacent area of the patient's body, and there is no reason to suppose that the cells of a malignant growth would not proliferate in other individuals also, if they could be introduced under suitable conditions. But the ordinary contact of physician or nurse with a patient, or between two persons residing in the same house, is not close enough for the transference of living tumor cells.

It may be asserted definitely that no relation has been observed between diet and neoplasia, since tumors are discovered with equal frequency in vegetarian races and those living on a mixed diet, nor is there any convincing evidence of a connection between the occurrence of neoplasms and the character of the soil, the climate, or other surroundings.

The possibility of inciting a new growth in tissues previously normal has attracted and maintained the interest of a large number of investigators. The recorded attempts are numerous and if, as is probable, there have been still others which have never been published because of their negative outcome, the number of times that the experiment has been made must be very large. The greatest number have been molded to fit one or the other of the two most widely known hypotheses of tumor genesis—the hypothesis of cell irritation and that of cell displacement, following which investigators have irritated cells or misplaced them in every conceivable way; but, save for Clunet's experiments, where sarcomata appeared in rats that had been exposed to x-rays, the outcome has always been negative. The power of these rays to incite malignant growth is sadly evident, moreover, in the number of roentgenologists who have developed carcinomata on the hands in consequence of the freedom with which they exposed themselves before the necessity for a protecting screen had been recognized. The recent work of Fibiger may prove to be a second ex-

ception: at present, however, it is still so recent as to lack confirmation. Fibiger reported carcinomata of the stomach in rats fed for sixty-six days or more on cockroaches infected with a nematode which he has named *Spiroptera neoplastica*, and for which the cockroaches *Periplaneta americana*, *P. orientalis*, *Blatta Germanica*, and the mealworm (*Tenebrio molitor*) are the intermediate hosts. In two instances the tumor metastasized in the lungs, and in one a secondary growth was discovered in a retroperitoneal lymph-node.

The problem of treatment is to find some substance which will exert a destructive action upon the malignant cell, while the other cells of the body remain uninjured: but the difficulty of discovering such an agent becomes more and more evident as we constantly fail to detect any distinct difference between malignant and normal elements, with the one exception, so far known, that the cancer cell usually possesses the power of continuous growth within the body. It has not been demonstrated beyond discussion that radium exerts a selective action upon the cancer cell, though its general cauterizing power is recognized, nor has chemotherapy yet offered anything of value; immunity also has proven a barren field, since the existence of anything in the nature of an antibody has never been clearly shown.

Surgery, therefore, offers at present the only rational method of combating the disease. The hope of substituting some specific means of treatment for this crude and only too often ineffectual procedure is based on the observation that transplanted tumors, and in a few instances even spontaneous growths, have been known to recede, although there is still no indication of the manner in which this process takes place. Accordingly, although many of the results of ten years' investigation have been negative in so far as immediate applicability is concerned, they have at least fully demonstrated the utter hopelessness of temporizing with malignant disease, and the imperative necessity of early and thorough removal.

A metastatic growth in a superficial lymphatic gland or a gland of the skin may sometimes deceptively simulate the appearance of a sebaceous cyst. In a patient suffering with a malignant neoplasm, therefore, the development of a "wen," especially if at an unusual situation, should be regarded with sufficient suspicion to prompt investigation of its interior.

THE EARLY DIAGNOSIS OF CARCINOMA OF THE UTERUS.

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Early diagnosis of carcinoma of the uterus implies the possibility of permanent cure; late diagnosis, on the other hand, means that the patient reaches the surgeon in an inoperable condition and that palliative measures alone can be attempted. The necessity for trying to obtain early diagnosis in cases of cancer of the uterus, or, in fact, of cancer in any portion of the body, is made evident by the observation that our results in cancer, particularly cancer of the womb, are not very encouraging. The fact that so many medical societies and individual gynecologists have attempted by propaganda to enlist the assistance of both the profession and the public, shows that honest attempts to catch the cases early have not been wanting. Lay bodies, likewise, have encouraged attempts. In spite of this, however, the actual results obtained have hardly shown improvement. The man who has most carefully studied the subject of propaganda and practiced it is Winter of Königsberg. As will be noted from his researches and those of others, a great many women, particularly those of the neurasthenic type, are frightened by the leaflets which they receive, while actual or potential sufferers from the disease are apparently more rarely reached. To expect the public at present to submit to bi-yearly prophylactic examinations is too Utopian a dream. Furthermore, it is no exaggeration to say that many general practitioners are unable to make a diagnosis of carcinoma of the uterus unless the symptoms are well marked and the disease advanced. Those women who are stolid in type, or those who are busy in their household or in their professional work, rarely pay attention to the beginning symptoms of cancer, particularly as cancer so rarely produces pain until it is far advanced. Moreover, the old deeply rooted idea that irregularity of menstruation is the rule and not the exception towards the time of the menopause has doomed countless women to lingering and painful death. The aversion to an examination while bleeding, arising partly from delicacy, partly from the fact that some physicians habitually refrain from examining patients while they are bleeding, has often been the cause of the waste of precious days, weeks, or even months. Only when the bleeding becomes constant, continuous, increasing in amount, when foul discharge

makes life unbearable to the sufferer, and when pain produced by the progress of the disease through the invasion of neighboring organs, grows more marked, and, finally, intense, do some of these women seek medical advice. Needless to say, the condition has then progressed far beyond the hope of cure, and palliative treatment alone is to be thought of. While palliation of such hopeless suffering is, of course, most necessary, our main efforts should be directed toward early diagnosis, which at the same time implies permanent cure. Not only the laity, but also the medical profession, must cooperate; yet I will confess that even such cooperation is unable to save more than a small number of women.

The propaganda must be continued without interruption and without slackening in private practice, in hospitals, in dispensaries, in social gatherings, and in whatever places it is feasible. The medical profession, on the other hand, must be trained from the bottom up. Apparently, there is a not inconsiderable number of doctors who, after they leave the medical schools, acquire no further knowledge, and, therefore, great care, great emphasis, and continual effort must be directed toward teaching the medical student.

Perhaps, considering the great influence that magazines and women's weekly journals exert among the lay public, it may become necessary to transfer a part of the propaganda to the press, to have popular articles published in the weekly and monthly journals. The danger of such a procedure lies in the fact that the neurasthenic class, to which reference has previously been made, will most probably respond in too great degree to the newly acquired knowledge, and will flood the medical profession with useless fears. If, however, only some of the energies at present expended in suffrage propaganda, in twilight sleep campaigns, etc., can be directed toward disseminating information on the prophylaxis and early diagnosis of cancer of the uterus, a good deal may be accomplished.

Turning now to the purely medical aspect of the question, there is no disguising the fact that many physicians either fail to examine their cases vaginally before marked symptoms develop, or, even if an early vaginal examination is made, are incapable of diagnosing the condition. The question naturally arises: Is the diagnosis of cancer difficult? Unquestionably there are very many cases, indeed, that require skill, practice, and judgment. Among them are especially those cases in which the cancer develops within the body of the uterus. Fortunately, however, this type of cancer is the least malignant of uterine cancers, and, therefore, if weeks or even

months are allowed to pass before the correct diagnosis is reached, no great harm results.

On the other hand, in cancer of the cervix and, to a certain degree also, of the vaginal portion of the cervix, every minute of delay is costly. The way to diagnose cancer of the uterus early is to be on the lookout for it in every suspicious case. The way to change mere suspicion into certainty is by excising small specimens of the cervix or curetting the canal, removing suspicious particles or ablating polypi, and at once submitting these specimens to microscopical examination. The preservation of such specimens will be referred to later. In these days of numerous laboratories, of rapid communication, of parcel post, not more than a few hours, or at most days, separate the most outlying isolated communities from some scientific center. Consequently, no excuse is valid for neglecting to have suspicious specimens examined by a competent pathologist. In many of the larger cities, institutions of research, boards of health, or medical schools volunteer their services in the case of impecunious patients; so that lack of funds is no bar to this examination. The true bar, and I do not propose to mince my words, is either the inertia or the ignorance of the medical practitioner. Too many physicians when confronted with suspicious erosions or enlargements of the cervix console themselves and the patient by talking of lacerations, of hypertrophy, and of inflammation, wasting precious weeks and months in tampon treatment, in applications of iodine, in douching, etc., instead of curetting or excising one or more suspicious spots and submitting the specimen to the pathologist. Only too often, if the uterus is curetted, the scrapings are thrown away without being examined microscopically. I often think that if only some of the energy wasted by practitioners in curetting post-abortion or post-partum could be directed into the proper channels, and their investigations confined to cases suspicious of cancer, much good would accrue to the human race.

The only way to safeguard patients against the danger of cancer is, I repeat, to be constantly on the watch for this disease. No age is exempt; I have seen cancer of the cervix in a girl of 18. No symptom is pathognomonic. Hemorrhage may be due to fibroids, to purely functional conditions, such as overactivity of the ovary, or to inflammation of the cervix, of the body of the uterus, or of the adnexa. Discharge, likewise, may be due to gonorrhea, to other inflammations either acute or chronic or even to functional hyperactivity of the ovary reacting upon the uterus. Pain, as previously mentioned, is a late symptom in cancer. As will

be seen from the preceding list of possible symptoms, the patient may consult the physician for one or more complaints. The symptom complained of in the case of a woman who watches herself carefully may be simply a slight, badly smelling leucorrhea, a small amount of bleeding after coitus, or a slight spotting between periods. On the other hand, a careless and stolid woman will not seek medical advice until the leucorrhea is foul, or until the hemorrhage is profuse and continuous. Her chances of radical cure will be less than those of the more observant patient. Other things being equal, the patient who seeks or is fortunate enough to find a wideawake and well trained physician will also run a better chance of cure.

Let us now take up seriatim the symptoms enumerated and see in how many cases they can be differentiated from other conditions.

A foul-smelling leucorrhea is very rare in conditions other than cancer, though gangrenous polyps extruding from the cervix, severe, neglected gonorrheal infections with dermatitis of the vulva, or venereal warts, may possibly produce a foul discharge. With these exceptions, it is almost always due to carcinoma.

Bleeding, on the contrary, is a symptom difficult to differentiate. Profuse bleeding is seen in cases of fibroid of the uterus. Here it begins usually as a profuse menorrhagia, becoming irregular in type only as the disease progresses. Furthermore, the irregular enlargement of the uterus is usually characteristic. If doubt exists, and the question of differentiation between carcinoma of the body and fibroids of the uterus arises, a diagnostic curettage must be performed, the curettings being carefully examined under the microscope. If profuse and irregular bleeding occurs without marked enlargement of the uterus, the diagnosis lies between a so-called "chronic metritis" (or hyperplasia of the various layers of the uterus, also called "fibrosis uteri," uterine "sclerosis," etc.) and corpus carcinoma or carcinoma of the cervix high up in the canal. Again the curette will give the proper differentiation. The sole contraindication to be considered before curetting a bleeding patient is inflammation, which may also produce irregular bleeding. However, unless the inflammation is quite acute, the damage done by the curettage is not irreparable. On the other hand, an acute inflammatory adnexal disease could but rarely be confused with cancer, even by the ignorant. In inflammation, pain, distributed throughout the pelvis and making a thorough pelvic examination almost impossible, is the rule. Fever, peritoneal symptoms, vomiting, etc., are also almost invariably encountered.

Pain need not be discussed in this connection, because when this symptom is due to cancer, the case will usually have long passed the early stage.

Suppose now that a practitioner is confronted by a patient who gives one or more suspicious symptoms, or in whom because of the advanced age of the woman, he is on the lookout for cancer. How shall he demonstrate the condition, if present, or absolutely exclude it, if absent? Naturally a vaginal examination must be made to determine the size, position, and mobility of the uterus, the size, softness, or hardness of the cervix, the presence or absence of bleeding when the cervix is touched, the palpability of the adnexa, and the mobility of the pelvic organs. This examination in itself demands a considerable degree of skill, and if such skill is possessed by the examining physician he will at once be in a position to know whether the uterus as a whole is enlarged or not. Considerable enlargement of the uterus will speak (though not with absolute positiveness, because the two conditions may co-exist) against carcinoma, and in favor of fibroids. If the fundus is small, movable, and uninvolved, while the cervix is large, the bleeding will probably be due to some new growth of the cervix.

The vaginal portion of the cervix, the "portio" so-called, for short, is, of course, accessible not only to the finger but also to the eye. Gross changes in its appearance are readily visible, but their interpretation is not always simple. Ulcers of various origin, such as those due to irritation of a pessary worn for a long time, or arising from a primary syphilitic infection, from tuberculosis, or from various less well defined infective causes, often leave even the most expert in doubt, and definite decision can be reached only after excision and examination of a specimen. Certain changes in the cervix are however, quite characteristic, not only to the finger, as localized hardness, but to the eye, such as cauliflower projections and wart-like or velvety growths, in which the color, the readily caused bleeding, the friability of the tissues, etc., are quite characteristic. Adeno-carcinoma within the cervical canal can sometimes escape cursory inspection and examination, since the os externum and the vaginal portion of the cervix may appear quite normal, although the growth within the cervical canal has reached considerable proportions and has formed a hollow, crater-like structure within the canal proper. Under such circumstances, the entire cervix, particularly the portion felt above the vagina, will appear enlarged, boggy, and resistant, will be hard to differentiate from the surrounding tissues, and will prove immovable when attempts to raise the uterus are made. The diagnosis can at once be made, how-

ever, if the external os is slightly dilated with a Hegar dilator and a small sharp spoon or small curette is introduced, because quantities of necrotic material will come away readily at the slightest touch of the curette, and these, if not macroscopically characteristic, can easily be recognized after sections have been made. This type of case, which, of course, is no longer an early one, is most likely to escape attention at its inception, because at the beginning of the disease a small amount of "meat-water" discharge will be the sole subjective symptom, and a slight infiltration of the pericervical tissues the sole objective sign. Should the physical examination prove unsatisfactory to the beginner in medicine or to the less expert general practitioner, it is far wiser to seek early consultation, even should the case prove non-malignant, than to take even a small chance of gravely or perhaps irreparably jeopardizing the life of the patient by procrastination.

From what has been said, it must be apparent that the most dangerous type of carcinoma of the uterus is that occurring inside the cervical canal. Carcinoma of the body of the uterus early produces irregular bleeding, is not very malignant, and even if neglected for a time can often be cured by operation. This type of growth occurs quite frequently at or after the menopause, so that patients report that their periods have become scant or have ceased. When tumor formation takes place, irregular profuse bleeding occurs and this may remain the sole symptom, though foul discharge and uterine enlargement may also develop. Cancer of the portio vaginalis, on the contrary, is subject to numerous traumata, such as those arising from coitus, douching, and vaginal examinations, and ought, therefore, to be discovered fairly early in its course. Cancer within the cervical canal however, is protected from external insults to a great degree, and is hidden from inspection until the external os is passed, and, at best, the growth has but a thin shell of uterine tissue between it and the surrounding tissues, the parametria. Early extension in this variety of tumor is, therefore, the rule.

Turning now to the material obtained either from curettage of the uterus or cervix or from excisions, there are a few points which require emphasis. The specimens should at once be placed in 5 per cent. formaldehyde, and after due fixation and impregnation should be cut into thin sections. Personally, I much prefer paraffin sections to those prepared by the celloidin method. Any good nuclear stain, if not too dark, will answer the purpose.

In early, doubtful cases considerable skill and experience are necessary in order to arrive at the

correct diagnosis. Much can be accomplished by a careful survey with low magnification, since the general appearance of the growth, its invasive distribution, the breaking through the basement membrane of the acini, and similar characteristics, are more apparent with the low than with the high power. After these main points have been studied, the higher power will show the type of cells in the growth, the presence or absence of mitoses, irregular nuclei, and other atypical formations. If curettings from the uterus are submitted for examination, it is highly important to see that a small quantity, at least, of each portion of the curettings is included in the sections, because at times only small particles of the growth reach the pathologist, and unless he makes a rule of examining parts of the entire mass submitted, he may well miss, for instance, a small adeno-carcinoma of the tubal angle. In examining excised portions of the cervix, it is extremely important that the sections be made exactly at right angles to the surface, since oblique sections through the epithelium sometimes closely imitate in appearance carcinoma of the squamous type, and should "benign epithelial proliferation" be present at the same time, the resulting confusion may make a correct diagnosis impossible.

In examining sections from the uterus difficulty may arise in differentiating marked glandular hyperplasia and "adenoma malignum" so-called, that is, adeno-carcinoma. However, even a moderate degree of practice should make it possible to eliminate the non-malignant condition. Excisions from the portio vaginalis are much more difficult to diagnose. Here erosions or small papillomatous growths or warts may very closely simulate malignancy. Therefore, in these cases in particular, thin, well-stained sections are absolutely essential. Should question arise in a given case, it is far wiser to submit the sections to other, more experienced pathologists than to attempt a snap diagnosis and take the risk either of suggesting hysterectomy in a non-malignant condition, or of allowing a still operable carcinoma to become inoperable by advising delay.

In this short and perhaps superficial paper, I have attempted to show that cooperation of the patient, the practitioner, and the laboratory pathologist is necessary. A slip in any of these links of the chain may result in grave danger to or in the death of the patient. To attain the desired results, patients must be instructed by propaganda, and physicians must be taught in the medical schools, and their memories constantly refreshed after they have entered practice. Essentials are: To make early and careful examinations; to think constantly of cancer as a possibility; to know the signs which these new

growths produce; to make frequent use of diagnostic excisions or curettages; and to call on the pathologist as an aid.

THE IMPERATIVE NECESSITY OF EARLY DIAGNOSIS AND EARLY OPERATION IN CANCER OF THE FEMALE BREAST.

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AN INDICTMENT.

Practically one-half of all the women who to-day die of cancer of the breast do so needlessly. Surely a terrific toll of life sacrifice.

THE PROOF.

It must be admitted that up to the present time surgical intervention alone has presented evidences of any real value in the cure of cancer, evidences backed by scientific diagnosis and followed relentlessly to final endings. Many agencies have been patiently tried, and all surgeons have hoped for some non-operative cure. But thus far no answer has come to our prayers. Until the day of such discovery dawns we are hence obliged to consider surgical intervention the only hope of saving the lives of any of the many victims of cancer.

What, then, has surgery proven? In 1907 the American Surgical Society presented a careful analysis of the end-results of operations for cancer of the female breast. The thoroughly investigated results of several of our largest surgical clinics were presented, and also the individual statistics of a large number of surgeons of widest experience. These statistics can be found in detail in the published transactions of this society for that year, and will not be stated here. Suffice it to say that, in general, these studies show that to-day under modern surgical methods from 25 to 40 per cent. of cases operated upon are permanently cured. These results are not brilliant, but they are at least encouraging. In the critical analysis of these cases, however, a more important fact was noted by several clinics. For instance, in the Johns Hopkins clinic the general average of cures was 42.4 per cent. In this same clinic, however, *in cases operated upon before glandular metastasis had taken place 85 per cent. were cured.* Crile's statistics showed only 14 per cent. of permanent cures where glandular involvement was present, but 80 per cent. of cures was obtained in cases operated before extension to the glands. Similar results were reported by several other surgeons who presented contrasts on the

basis of the period of operation. In other words, the prospect of permanent cure was twice as great where cases were operated upon early. When we also consider the mortality of cases coming to the surgeon too late for operation to be even considered, we are more impressed with the enormous percentage of unnecessary mortality. We are certainly justified in saying that to-day in operated and unoperated cases at least 75 per cent. of all women with cancer of the breast die of the disease. In contrast, if every case of cancer of the breast were operated upon in an early stage, at least 75 per cent. would be permanently cured.

Conclusion: At least 50 out of every 100 deaths from cancer of the breast could be avoided, therefore, if only the cases were operated upon early enough. Surely, therefore, the responsibility of early diagnosis and early operation is enormous. As William Francis Campbell, of Brooklyn, has so forcibly said, "Given a patient with cancer of the breast in the first state, consulting a physician on its first detection, the fate of that woman is in the hands of the doctor whom she first consults, provided she follows his counsel."

DIAGNOSIS.

Lump in breast: In practically all cases of cancer of the breast, the first evidence is a lump or tumor in the breast. This has been the case in at least 95 per cent. of all our cases. In most cases this lump is accidentally discovered by the woman, and is without attendant pain or discomfort. In only about 5 per cent. of cases is the lump in its early stages either preceded by or attended with pain. This fact should warn us against the folly of expecting or waiting for pain as an evidence of cancer. It is generally a quite late sign, one often manifest only when the disease has so far advanced "that a wayfaring man, though a fool, could not err" in diagnosis. Therefore, when a woman presents herself for examination for a lump or tumor in the breast, we should at the outset bear in mind certain most suggestive historical facts:

(1) *Statistics of tumor malignancy:* We should know that extensive statistical records have proven that from 80 to 90 per cent. of all tumors of the breast are malignant. According to Billroth's statistics, embracing 440 cases, 82 per cent. of all tumors of the breast are cancer; Schmidt, of Heidelberg, found 82.66 per cent. malignant; Bryant, 83.16; Gross, 82.47. The author of the chapter on breast tumors in Von Bergmann's "Surgery" states that, in his clinic, of 359 tumors of the breast, 306 were carcinoma, or 80.9 per cent.; thirty-four were sarcoma, 9.1 per cent., making the total of malignancy 90 per cent., while but nineteen of the series

were benign growths. Jonas, of Omaha, in a recent report embracing 260 cases from his experience, found 218 cases, or 87 per cent., malignant and forty-two, or 13 per cent., benign.

When it is further remembered that many cases apparently benign at the outset finally undergo or manifest malignant development, the figures become most impressive. C. H. Mayo tersely remarks 'that 80 per cent. of all breast tumors are primarily malignant; that of the remaining 20 per cent. of primarily benign growths, one-half ultimately become malignant, raising the final percentage of malignancy to 90 per cent., and that the remaining 10 per cent. must be viewed with great suspicion.'

(2) *Age:* Cancer of the breast is, generally speaking, a disease of middle life, the average age, according to Crile, being 49. The complete statistics of the Massachusetts General Hospital show, of a total of 309 cases, five occurring between the ages of twenty and thirty; fifty-six between thirty and forty; 120 between forty and fifty; 107 between fifty and sixty, and twenty-one between seventy and eighty. It is also noteworthy here that while cancer of the breast is quite rare under thirty, yet it does occur. On the other hand, it is quite probable that most malignant tumors show themselves at an early age in the woman's life. Indeed, I feel that we may generally assume that a tumor in the breast of a woman under thirty years of age, except with pathognomonic evidence of malignancy, is probably benign, while after we pass this age the probability of cancer becomes so much greater that we will be much safer in assuming malignancy as a fact.

(3) *Heredity*, on which in the past much stress has been laid, is of little importance, and in only about one-third of our cases can an heredity history of cancer be found.

(4) *Lactation factors* likewise are of little significance, since, according to Crile, 35 per cent. of his cases had not borne children and in but 11 per cent. was there distinct a history of lactation complications. It is quite probable, however, that chronic mastitis has something to do in producing a favorable nidus for cancer, as is true in chronic inflammation elsewhere.

(5) *Injury* likewise has some influence, but is of too little importance to be significant. In fact, it is too easy to find a history of injury antecedent to any condition to which the human flesh is heir, if we but ask for it.

Giving whatever weight we wish, however, to these data, we are finally forced back to physical findings for correct diagnosis in a given case.

Physical examination: Palpation, therefore, becomes probably our most accurate recourse in diag-

nosis. The intelligent manipulation of a hand trained in the sense of touch is of paramount importance. For the exercise of this faculty it is essential that the flat of the fingers and palm of the palpating hand should be pressed gently down upon the breast and the tumor thus defined between the hand and the unyielding chest wall behind. Pinching up the breast between the fingers has doubtless led to many fallacies, oftentimes, I am sure, leading to the removal of mammary glands in which there was actually no disease present whatsoever. When we remember that the breast is a lobular organ, it follows that in pinching up a breast, as I have seen many do, we can find an apparent tumor, certainly a mass in all. With the hand or fingers flatly applied to the chest, however, and gently compressing the breast between it and the bony wall, then moving the breast beneath horizontally over the underlying ribs with the skin fixed by contact with the hand, any existing tumor, even though small, can be detected with surprising ease and accuracy. The nodule may be exceedingly small, yet the stony hardness of a cancer growth will be striking and characteristic. Careful comparison in all manipulations should be made with the healthy breast, though here it should be remembered that bilateral disease, while infrequent and therefore improbable, is not impossible. A carcinomatous tumor is generally single, and multiple tumors speak against malignancy. The cancerous growth likewise infiltrates the normal breast tissue, and this not being circumscribed, it moves with the breast in which it is definitely fixed. It is also quite apt to become fixed early either to the skin overlying, in superficial growths, or to the pectoral fascia beneath, in deep-seated growths. The skin attachment is easily recognized. The fascial attachment may become evident only when the arm is carried upward and outward, rendering the pectoral muscles tense. Then oftentimes the tumor and with it the breast become absolutely immobile on the chest wall. It is also important to observe the relative amount of normal gland remaining outside the area of the tumor. Inasmuch as the cancer grows at the expense of the breast, and fibrous tissue contraction accompanies the process, there is often but little normal gland tissue left. The extent of this ratio is often also an evidence of the rate of growth, which may be of service in prognosis as well as in diagnosis. In simple tumors, on the other hand, the normal breast tissue is pushed aside, but not consumed.

The tendency of the fibrous tissue trabeculae to shorten and thus fix the breast may also give visual evidences even at a very early stage of the disease, in the slight dimpling of the overlying skin evi-

denced by moving the breast over the chest wall, producing also a sensation of tugging to the examining hand. Halstead especially lays great stress on this sign, even going so far as to say that "the faintest conceivable trace of a difference on the two sides in a minor pectoral crease, for example, may suffice for the diagnosis. Frequently there is no sign, but this almost imperceptible suggestion of pull, which, when the faintest possible, is, of course, elicited by dislocation in one direction only. This sign, however slight, is all that is needed for the diagnosis." Surely, however, we must remark, extreme care must be taken in this test, and only an experienced examiner of breast tumors could follow the refinement of Halstead's test in its entirety. When well developed, however, it is surely trustworthy. Minute comparison of both breasts is, of course, essential.

The sign of retraction of the nipple, on which so much reliance was formerly put, is not now given so much prominence. In some subjects it will be found that this characteristic is found normally and is then present in both nipples. When present in one nipple alone, it is still a highly significant sign. Its absence, however, is of little value in negating a diagnosis. In fact, Crile found it present in only 33 per cent. of his cases. It must be remembered that this sign is likewise dependent upon shortening of the trabeculae, and unless the growth is in the central area or quite near the nipple, no retraction will occur except in a large or well-advanced cancer.

The fat overlying a cancerous nodule, if it be superficial, is oftentimes absorbed, also lessening the freedom with which the skin moves over the tumor and oftentimes making the tumor stand out so prominently as to be at once apparent to the inspecting eye. In early diagnosis, particularly in that of deeply seated nodules, it is valueless.

The involvement of the axillary glands and their enlargement come sooner or later, alas often too soon. It is to be remembered that acute inflammation, tuberculosis, etc., can likewise produce enlargement of the axillary glands. The local evidences of infection and inflammation, however, are usually so easily recognizable in these diseases as to lead to no confusion in their differential diagnosis. With these inflammatory causes set aside, the evidence of enlarged axillary glands is quite conclusive of cancerous disease. In fact, the diagnosis should be made before this symptom is evident.

Ulceration, emaciation, and cachexia are such late evidences as to be of no service to a clinician. By the time these symptoms are manifest, a housemaid could make a diagnosis.

Operative diagnosis: After, however, all is said as to physical diagnosis, and all the various diagnostic signs have been fully exhausted, we must yet admit the fact that in many cases preoperative absolute diagnosis is impossible. This is particularly true in the earliest stages of the disease. And here is to be found, therefore, the somewhat plausible excuse for a course of hesitation, palliation and delay, so fatal in the end to the unfortunate woman. When, however, we reflect that even a benign tumor never disappears except by removal; when we remember that, from the aspect of general probabilities alone, the chances are nine out of ten in favor of malignancy; when we realize that a simple incision will make a diagnosis absolutely clear, is there then left any possible excuse for the responsible physician to counsel a course of procrastination which, as we have shown, probably robs the sufferer of one-half her chances of life?

We would insist, therefore, that every case of tumor in the female breast should be submitted to operation the moment it is first detected. Through a simple incision of the Warren type, with but little scar, the tumor can be exposed, excised and by immediate examination a positive diagnosis will be obtained. With Bloodgood we believe that in most instances the diagnosis will readily be made by the experienced surgeon from the mere gross appearance of the tumor after incision. If any doubt exists, however, a competent pathologist should be at hand for the immediate microscopic diagnosis of the tumor by frozen section. This proceeding will occasion a delay of only from five to ten minutes and will furnish a practically exact diagnosis. In our experience, the possible error from frozen section diagnosis is absolutely immaterial if the pathologist is experienced and competent. We cannot too strongly condemn the policy, once in vogue, of excision followed by delay for fixation of specimen and later diagnosis followed by secondary radical operation should cancer be found. Halstead has shown in his Johns Hopkins researches that in no case of cancer of the breast in which this delay was permitted has a final cure followed. When the tumor is once cut into operation should be completed either as a simple operation for a simple tumor or as a radical one for the cancer at this primary operation. If the tumor proved benign, without risk to the patient, without mutilation and with only an insignificant scar, the patient has been relieved of a growth which could not have been otherwise dissipated, and which as long as it remained constituted a menace from possible secondary malignancy. On the other hand, should the tumor prove malignant, this early recognition and early radical treatment

will have raised the chances of that woman's life from 25 or 40 per cent. to 75 or 80 per cent.

Certainly with these evidences to-day one is practically following a criminal course who does not insist upon the immediate exploration of every tumor in a woman's breast as soon as it is first found.

CANCER OF THE BREAST.

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Excluding uterine and gastric carcinomata, the breast ranks highest as a favorite site of malignant neoplasms. If it be granted that the only cure for mammary carcinoma consists in the application of radical surgery, it naturally follows that diagnosis should be perfected, and the patient subjected to operation at the earliest possible moment.

While under ordinary circumstances it would appear that there should be little difficulty in the diagnosis of mammary carcinoma, instances are many where it is impossible to definitely determine before operation whether the neoplasm is malignant or benign. In considering mammary tumors, one must constantly bear in mind that the mamma is composed largely of glandular tissue that is subject to periodic activity and stimulation, and that benign neoplasms in this situation are especially prone to undergo malignant transition. With this knowledge, and based upon practical experience, I have become convinced that as soon as discovery every mammary tumor should be surgically removed, regardless of the age of the patient and the apparent clinical benignity of the growth. There are, however, certain mammary neoplasms which can usually be recognized as benign, and others which can be almost certainly diagnosed as malignant. Those which have given me the most concern are the so-called borderline tumors, such as intracanalicular, papillo-fibromata, adeno-cystomata, and, in certain cases, even the simple cystomata. What shall be advised in borderline cases where there exists definite pre-operative diagnostic uncertainty? The best interest of the patient would hardly seem to be conserved by radical extirpation of the breast in every case where non-malignancy is not absolutely certain, although personally if my suspicions of malignancy were sufficiently strong, I would not hesitate to advise the radical procedure.

In every instance the mammary gland or the extirpated tumor should be subjected to careful microscopical scrutiny to definitely establish the diagnosis,

and if non-malignancy be shown, the patient should be so informed, as nothing could be more unfortunate than for a woman to be impressed with the probability of recurrence after removal of a mammary tumor. I believe there are many instances in which presumably malignant mammary neoplasms have been removed and not subjected to microscopical examination, the operator being satisfied of malignancy from the gross appearance noted upon incising the specimen after extirpation; also that in many instances where patients have recovered without subsequent recurrence after removal of mammary tumors by either simple excision or radical extirpation, the microscope would have shown that the neoplasms were not malignant. However, I would not be understood as advocating operative delay until the diagnosis can be made absolutely, as undoubtedly the greatest good to the greatest number will be subserved by occasionally sacrificing non-malignant breasts rather than by failure to radically remove a single malignant tumor in this situation.

Wherever it is possible, should there be any doubt in the mind of the surgeon, the tumor should be subjected to immediate microscopic examination by frozen section, before proceeding with the radical removal. There is little danger of fresh fields being contaminated by carcinoma cells if the preliminary incision be immediately cauterized; and whether it is believed the neoplasm be carcinomatous or otherwise, where a section is removed for microscopical examination, the knife should always be directly followed by the cautery to prevent possible entrance of carcinoma cells into subjacent tissues, provided malignancy is proved. The surgeon of wide experience can make the diagnosis of carcinoma in most cases after preliminary incision, by the sense of touch and appearance of the tumor, without the aid of the microscopist; but although few mistakes may be made, the post-operative employment of the microscope is necessary not only for the benefit of the patient, but also for that of the surgeon in his future conduct of the case as regards watchfulness for recurrence, prognosis, etc. An important feature which should be remembered in connection with microscopical examination at the time of the operation is that certain portions of a mammary tumor may be malignant or undergoing malignancy, whereas the section subjected to the microscope may be perfectly benign; this has been found notably true in adenomatous neoplasms and "involuting mastitis."

In the diagnosis of mammary carcinoma, the so-called "cancer age" must be always borne in mind.

Mammary neoplasms in women who have arrived at the cancer age should invariably arouse suspicion of malignancy; in young women cancer also sometimes occurs, but in them the percentage of carcinomata among the mammary tumors is much smaller. Pain, fixation of the skin, as evidenced by the so-called "pig-skin" appearance, retraction of the nipple, and secretion from the breast, are all indicative of probable malignancy.

In determining the presence or absence of a mammary tumor, the patient should be stripped to the waist and examined both sitting in a hard-back chair and in the recumbent posture, both breasts being exposed and compared as to size, consistency, appearance, etc. Tumors or irregularities in consistence may be most easily discovered by using the entire palm of the hand in palpation.

The diagnosis of probable mammary carcinoma having been made, what should be the method of procedure? I believe it is generally agreed that the only curative treatment thus far discovered for carcinoma is radical excision by the knife; this applies regardless of the situation of the tumor, with the possible exception of skin epitheliomata, which may sometimes be successfully removed by the actual cautery, by repeated applications of corrosive pastes, etc. Immediate radical extirpation should be undertaken of every mammary carcinoma, no matter how small nor how extensive the neoplasm, unless the case be deemed inoperable from the standpoint of probable cure. Every mammary carcinoma classed as "operable" should be subjected to radical removal by the knife.

My conception of radical extirpation is a procedure which contemplates not only removal of the breast, but also both pectoral muscles, the infraclavicular and axillary glands, the fatty contents of the axillary space, and the lymphatics just beneath the edge of the scapula. The incision should circumscribe the breast wide of the nipple, extending progressively wider as the deeper tissues are penetrated. By no other method of procedure may one hope to effect a permanent cure. The mere removal of the breast together with the pectoral fascia and axillary lymphatics, particularly by finger dissection, is never sufficient to insure enduring relief. The incision should begin in the axilla and the blood-vessels be controlled first; in this way the procedure is markedly simplified and much less blood lost by the patient. The plan suggested by Rodman has been found a satisfactory and easy method of approaching the axilla for preliminary ligation of the vessels before extirpating the breast. He has emphasized the importance of removing all the fascia and muscles, even a portion of the fascia

of the rectus abdominalis. Even with the wide skin incision recommended, it has not been found necessary in my experience to use skin grafts, nor has there been difficulty, excepting in one instance, in bringing the edges of the incision together. This can always be accomplished if the skin is dissected sufficiently far backward to make a sliding flap. It must be remembered that in operating for mammary carcinoma, cosmetics are entitled to no consideration.

Post-operative x-ray treatment should be commenced immediately after removal, whether glandular involvement has occurred or not. Where adjacent lymphatics are extensively implicated, the patient should be subjected to the x-ray treatment on alternate days extending over a period of about three weeks. Where there has occurred considerable axillary glandular involvement, it is my practice to leave the axilla open until the patient has received six x-ray treatments of rather high amperage, *i.e.*, enough to "sun-burn" the skin, and then close the remaining portion of the wound by Michel clips.

My observation has led me to believe that where supra-clavicular involvement has occurred, notwithstanding the fact that these glands may be removed in toto with the breast after resection of the clavicle, recurrence is almost certain, and this class of cases must invariably be considered as inoperable from the standpoint of ultimate cure.

Within the last three years all my operations for mammary carcinoma have been performed under gas-oxygen anesthesia and the anoci-association method of Crile, which I regard as one of the most important advances in surgical technic within recent years. Under this method of procedure the patient suffers absolutely no post-operative pain, there is no shock from the operation, no post-operative nausea, no vomiting, and the patient can usually leave the bed within forty-eight hours.

During the last seven years I have operated upon many patients for mammary carcinoma, of which forty-eight were in private practice, the remainder in municipal hospital work. In every case the clinical diagnosis was confirmed by the microscope and the radical operation was performed. Eighteen of the forty-eight private patients are still living after three years, as are also a number operated upon less than three years ago. Eight are living without recurrence or metastasis after the expiration of five years.

Fourteen patients died of local recurrence or metastasis; one died of liver metastasis; one of mediastinal recurrence; three of spinal metastasis;

one of pleural metastasis. One patient still living three years after the original operation had a recurrence in the scar, which was removed and followed by x-ray treatment, with no further evidence of the disease. Two of the patients, after two and three years, respectively, developed carcinoma of the remaining breast, which was also radically removed. One of these patients later died of tuberculosis, the other is still living now between three and four years since the last operation.

One patient returned with metastases involving the left parietal and left maxillary bones, and the second lumbar vertebra, the body of which has almost entirely disintegrated. Another, operated upon two years ago, returned within the last week with supraclavicular glandular involvement of the opposite side, which is probably carcinomatous in character. The structures above the breast are infiltrated and there is probably mediastinal involvement, although this has not yet been positively determined by the fluoroscope.

In four cases, then, vertebral recurrence has been noted, the patients coming under my observation the second time—one with the diagnosis of "rheumatism" and the other three "sciatica." The fact is emphasized by these four cases that the development of "rheumatic pains" in the hip, back, legs, etc., a year or more after the excision of mammary carcinoma should always be regarded as suspicious of spinal recurrence. The x-ray is a most important diagnostic agent, particularly where the disease recurs in the vertebral column.

400 ATHERTON BUILDING.

PAIN AND RETRACTION IN BREAST CANCER.

Nearly all physicians depend upon two signs in cancer, which frequently, even in advanced cases, are not present at all. One is pain and the other is retraction of the nipple. Pain is almost invariably absent for the first year or more of cancer of the breast. I do not know of any condition about the breast that is as painless as cancer. Benign growths, cysts, and involution mastitis, all give more or less pain. Cancer gives none. Retraction of the nipple, at the very most, occurs in 51 per cent. of all cases.—WILLIAM L. RODMAN, in the *Pennsylvania Medical Journal*.

Multiplicity of tumors of the breast usually speaks against carcinoma.

EARLY RECOGNITION OF MALIGNANT DISEASE OF THE BLADDER AND OF THE PROSTATE: OPERATIVE THERAPY.

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Malignant disease of the bladder and of the prostate rarely induces symptoms until the early stage in the disease is passed. It is for comparatively "late" symptoms that the patient consults his physician. The recognition of the trouble at this stage is all that we can expect to accomplish, though occasionally in the course of a routine examination we may discover a malignant growth, which had given very few if any focal symptoms. (A patient may complain of lumbar pains, and on cystoscopic examination we find that a carcinoma has shut off the corresponding ureter. Such a diagnosis might be very early in the career of that particular tumor, and its recognition at that stage would be accidental; again, in the course of a cystoscopic examination for some other indication, a tumor may be encountered early.)

If every patient who had suffered from an unsatisfactorily explained hematuria were cystoscopically examined, benign and malign growths in the bladder would come under treatment at a much earlier period than they do at present. The same applies to cases of intractable pyuria. Moreover, if the routine examination of patients included a rectal examination of the prostate, slight irregularities in the organ, areas of induration, asymmetries, would assume a significance which at present they do not enjoy.

Bladder Carcinoma: Experience has shown that in the great majority of cases of papillary vesical neoplasms we can determine whether we are face to face with a benign or with a malign tumor. A benign papilloma is usually very frankly so, and is readily recognized by the experienced cystoscopist in the great majority of cases. There is also very little trouble in recognizing a frankly malignant papilloma (or a flat carcinoma), with infiltrating edematous base and more or less necrosis of the thick papillae. Between these two extremes even the most careful observer may have great difficulty in deciding what he is looking at. In these cases, I believe we all will occasionally go wrong, and temporarily misinterpret our cases. I can recall one patient with four papillary tumors in the anterior bladder wall, who had been treated with the high

frequency current for seven months by a leading specialist. I attempted the same therapy and, getting no result, I exposed the bladder by operation, on the suspicion of carcinoma, and much to my surprise found that the whole bladder was so infiltrated that a cystectomy had to be done. Here the comparatively innocent looking papillomata, which did not respond to the therapy, and which, by the way, showed carcinoma under the microscope, were the only visible expression of the extensive disease.

To avoid such errors in diagnosis, I feel that we must rely upon the microscopic study of excised pieces of the suspicious growths. This excision should be made at the first or second cystoscopy, and pieces as near the base as possible should be cut away. Parts that look like frank papilloma should not be excised, but those areas that look suspicious. Other pieces of tissue can be obtained from fragments remaining attached to the electrode after high frequency cauterization, and others again from the voided urine or the bladder washings. All tissue should be examined. I have repeatedly been able to decide on the malignancy of a case by specimens which the patient has passed.

Response to the high frequency cauterization, i.e., destruction of the growth, will, I think, exclude the neoplasm from the malignant group. Lack of response or lack of complete destruction is characteristic of malignancy, though it also occurs in the presence of what looks like a severe cystitis. Whether these are infiltrating carcinomata with papillary excrescences, and not bona fide cystitides, I do not know. Two cases followed by me eventually proved to be infiltrating carcinomata.

By rectal palpation, one can recognize a malignant bladder tumor with some frequency. Within a recent brief period, we were able to diagnose papillary carcinomata in six successive cases by feeling a distinct mass above the prostate in the site of the papillary growth as seen in the cystoscope.

If no decision can be reached, which is most exceptional, an exploratory operation must be resorted to. This permits of gentle palpation of the indurated (?) base, often without even opening the bladder.

To sum up, a bladder carcinoma is recognized by:

- (a) Its characteristic cystoscopic appearance.
- (b) Its characteristic microscopic structure.
- (c) Its lack of response to the high frequency cauterization.
- (d) Its recognition by palpation through the rectum, as a distinct mass in the position occupied by the tumor in the cystoscopic picture.

(c) Exploratory suprapubic palpation.*

Carcinoma of the Prostate: It is well within the truth to say that most prostatic carcinomata are recognized by the pathologist. Of the usual "prostatic hypertrophies" or adenomata, 10 to 25 per cent. show carcinoma microscopically. Clinically these, the vast majority of the carcinomata of the prostate, gave no evidence of malignancy. They were accidental discoveries, and were hidden within benign growths. In addition to this type which is not recognizable clinically, carcinoma of the prostate presents itself as a hard nodule or nodules, or as a hard infiltration of the prostatic tissue, as felt per rectum. This type remains within the capsule for some time, as distinguished from the third type which breaks through the capsule and infiltrates the cellular planes of the pelvis. Irregularities in the contour, hard nodules, stoniness of part or all of the gland, periprostic thickening, especially toward the seminal vesicles, felt through the anterior rectal wall, suggest malignant disease of the prostate, though prostatic calculus, chronic abscess, chronic prostatitis, may present themselves in a guise very similar to that of carcinoma.

Urethroscopically in carcinoma of the prostate, the contour of the neck of the bladder may present marked irregularities such as are rarely seen with the adenomata of the prostate. Moreover, one may be able to detect a peculiar rigidity of the prostatic urethra in these cases, which is lacking in the elastic adenomata.

Despite all these physical features, an exploratory perineal section and an immediate frozen section of the excised nodule or suspicious area may be necessary to clarify the case, and to justify the radical extirpation that was contemplated.

OPERATIVE THERAPY.

Treatment of Carcinoma of the Bladder:(a) *Radical.*—

- I. Excision with cautery (partial cystectomy) after cauterization of growth through bladder incision (Beer), with or without ureteroneostomy. (a) extraperitoneal; (b) intraperitoneal.
- II. Excision of whole bladder (complete cystectomy), with (a) bilateral nephrostomy (Watson); (b) ureters in skin, intestines, etc. (Bori button).

*One may be forced to avail one's self of an argyrol picture to demonstrate the bladder wall involvement, as suggested by Kelly, when for some reason cystoscopy is impossible. It is scarcely necessary to say that direct inspection is a more valuable method, and that recognizable deformity of the bladder in the x-ray cystograph, like cachexia, is usually a late sign.

(b) *Palliative.**—

- I. Nephrostomy, bilateral.
- II. Ureterostomy, bilateral
- III. Suprapubic cystostomy
- IV. (No operation, x-ray, radium, morphine, etc.)

Treatment of Carcinoma of the Prostate:(a) *Radical.*—

- I. Total excision through perineum, removing prostate and vesicles in one piece (Young).
- II. Total excision, abdomino-perineal; removing bladder, vesicles, iliac glands and connective tissue, etc., together with prostate in one piece (Beer). Ureters in skin, etc. (Vide ante All a,b).

(b) *Palliative.**—

- I. Remove as much as possible of the gland, leaving the capsule *in situ*. (Suprapubic approach preferable, as there is no chance of spilling carcinoma cells in the periprostic tissues.)
- II. Suprapubic cystostomy.
- III. X-ray and radium treatment.

48 WEST SEVENTY-FOURTH STREET.

THE EARLY DIAGNOSIS OF CANCER OF THE BLADDER.

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The problem of dealing with vesical cancer is no different than the problem of dealing with cancer situated elsewhere in the body, namely, that in the light of our present knowledge, some form of surgical intervention is the only curative agent and the probability of cure depends upon early recognition of the disease. Nowhere, however, in the field of surgery have the end-results been so discouraging as in malignancy of the bladder. The reason for this is readily accounted for, but unfortunately difficult to remedy.

The statistics of cures of vesical cancer will not improve to any great extent until the medical profession at large has one fact so strongly impressed upon it that it will never be forgotten. The fact is that *hematuria is frequently the only early symptom of bladder tumor*. If case histories of patients suffering from cancer of the bladder are carefully reviewed, it is of common incident to find that the symptoms of painless hematuria, lasting for but a short time and clearing up, and to have been more or less ignored by the patient or his medical adviser until more acute symptoms indicate disease of the bladder. This primary painless hematuria may have

*Many patients that report at the very first symptom have progressed so far, or are such poor operative risks, that a radical operation may be out of the question.

taken place months or years before unmistakable clinical evidence of malignancy appeared. By means of continual effort, the medical profession at first and later women have been educated to appreciate the dangers which lurk in the apparently innocent breast induration. Similar publicity should be given to the possible danger lurking behind a painless hematuria in a patient in otherwise apparently good health and it should be made so common a piece of knowledge that the patient will himself demand such examination as will lead to at least an exclusion of the possibility of neoplasm.

In 1791, Chopart in his work, "*Traité des Maladies des Voies Urinaires*," called attention to this associated hematuria, and certainly it would seem that sufficient time has elapsed for its importance to be more generally appreciated than it really is.

Cancer of the bladder comprises about one-half of the bladder tumors. Of the so-called benign tumors, the most characteristic is the papilloma, and it is also the most amenable to treatment. It has, however, a tendency to become malignant in 65 per cent. to 75 per cent. of cases. (Mandlebaum, Zuckerkandl.)

From their structural origin, bladder tumors are differentiated into, the epithelial and growths which spring from muscle or connective tissue, namely, papilloma, adenoma, carcinoma, and cysts or myxoma, fibroma, myoma, sarcoma, and aberrant types. However much these histological features may interest the pathologist, the important point is that practically all of the bladder tumors are potentially malignant and should be so considered by the clinician. The question of diagnosis is thus resolved into establishing the presence of bladder tumor without delaying its surgical destruction by a prolonged attempt to definitely decide its histological characteristics before curative measures are instituted.

Cystoscopic examination has so broadened diagnostic possibilities and in the hands of trained urologists has become of such diagnostic precision that in most instances where a bladder tumor exists a fairly accurate estimation of benignancy or malignancy can be readily foretold. Great stress has been laid upon the value of information derived from submitting to the pathologist fragments of tumor removed through an operating cystoscope. The futility of this has been so often manifest that I consider it of but small value. Tumors are so frequently of transitional formation that unless the whole tumor be submitted, error is liable to occur. In this connection, Stammeler has stated that in the diagnosis of carcinoma, not only the portion of epithelium and stroma must be considered, but also the

presence of atypical epithelial nests, which Kummel thinks are precancerous changes, and which explains recurrences after the removal of so-called benign tumors.

Cystoscopic differentiation between bladder neoplasm and conditions simulating them are well recognized and need but passing mention. The common conditions being diverticulitis, vesical tuberculosis, ulcer, and encysted calculus. A condition which should not be forgotten in cases of diverticulitis is the possibility of tumor formation occurring within the diverticulum. Young, in 1909, reported such a case in which carcinoma had developed within a diverticulum springing from the posterior wall of the bladder. Cystoscopy revealed merely a large organized blood clot within the bladder, and at cystotomy performed for the removal of the blood clot, the carcinomatous diverticulum was discovered and removed.

Phillipowitsch, of Breslau, recommends x-ray diagnosis of bladder tumors when urethral stricture obviates cystoscopy. The technic embraces filling the bladder with 5 per cent. collargol solution and removing it by distending the bladder with air. The collargol adhering to the tumor outlines its contour in the radiograph. He claims this will show bladder wall involvement at an early stage. Some such scheme might be of use in a case of carcinoma of a diverticulum, provided that none of the collargol solution remained in the diverticulum after evacuation.

Vesical tuberculosis is, as a rule, secondary to a descending or ascending genito-urinary tuberculosis, so that differentiation from neoplastic ulceration is almost self-evident. Nevertheless, tuberculous tumor masses do occur and may give rise to perplexity. Frank, of Berlin, has recently reported two cases which he removed by the bipolar applications of low-tension high frequency current.

Other than the infectious ulcers (tuberculous and those complicating chronic cystitis), the simple ulcer may give rise to some doubt as to its being of malignant type.

Simple ulcers are usually found in one of two situations, either near the bladder neck or trigone or near the vertex. The first type, well described by Fenwick, are superficial in character and in them an important feature is hemorrhage. Seri has described the simultaneous occurrence of a papilloma and a primary simple ulcer of the bladder. The second type are infiltrating in character and extend to all coats of the bladder, and frequently involve the peritoneum; hemorrhage is less apt to be present, while pain is constant.

Le Fur, in his book, "Des Ulcerations Vesicales," published in 1901, gives Lawson Tait credit for first calling attention to the simple ulcers. Buerger has reported two cases. Recently Hunner has reported eight cases of the perforating type in women. He observes that cystoscopically they may be overlooked, because of the slight mucous membrane changes, and attention may be first called to their presence by noting white scar areas. Beside the white scar area is seen a slightly hyperemic spot or a collection of a few fine blood-vessels.

The simple ulcer of the trigone will, as a rule, respond to topical treatment. Buerger has obtained marked improvement by fulguration. On the other hand, the perforating ulcer of the vertex necessitates excision of the inflammatory area with the entire subtending bladder wall. These points in treatment therefore become of diagnostic importance.

The last few years have seen a rapid development of the use of electrical cauterization of bladder tumors by means of the cystoscope. It is not within the scope of this paper to dilate upon its curative value, but a word may be appropriate concerning the diagnostic value of the high frequency current in particular when applied to bladder tumors. The comment is that unless tumor destruction is marked and rapid after a few applications of the treatment, it is in all probability malignant, and if the growth is removable by surgical excision, that the patient should be advised to submit to operation, rather than persevere with the less radical measure.

It might seem unnecessary to caution against omitting a bimanual palpation before arriving at a diagnosis in bladder cancer, but I consider it of considerable moment. It is not possible to always decide definitely as to the extent of a vesical growth by cystoscopic findings alone. The smallest portion may be the intravesical projection, and any prognosis as to possible removal made merely by cystoscopic examination may require revision after a bimanual palpation of the growth.

I have purposely not taken up all of the symptoms of advanced carcinoma. They constitute an only too well-known picture. The early diagnosis of bladder cancer must depend upon our ability to make the patient and his medical adviser believe in the importance of heeding the first red sign of danger, the hematuria. Our ideas concerning tumors are undergoing revision. The minute cell structure is considered of less importance than a decade ago. We are more interested in ascertaining the nature of the precancerous forerunners. The understanding and elimination of these will take us far toward the long hoped-for solution.

The comments of Moullin (*The Cancer Problem, Annals of Surgery*, January, 1915) upon cancer in general are especially applicable to bladder tumors and they are therefore well worth quoting:

"It certainly cannot be separated from other tumors. No definite line can be drawn between cancer and sarcoma on the one hand, nor between cancer and certain varieties of undoubtedly innocent tumors on the other. For convenience of classification innocent tumors are collected into one group and malignant ones into another but between the two there is a borderland in which no one can say to which side the growths belong, nor even whether they do not belong at some time to one side and at another to the other. It is certain that many innocent tumors end by becoming malignant. And what are called malignant tumors differ among themselves no less in the degree of their malignancy. There are no hard and fast lines of division anywhere. It is a mistake to try and form a conception of cancer as something apart from all other tumors. It is one of them, and not to be separated from them. The clinical features so often regarded as distinctive, such as the power of dissemination, are in no way peculiar to it. They are merely an exaggeration of powers that can be exercised by many embryonic cells."

BOOK REVIEWS.

Cancer: Its Cause and Treatment. By L. DUNCAN BULKLEY, A.M., M.D., Senior Physician, The New York Skin and Cancer Hospital, etc. Duodecimo; 232 pages. New York: PAUL B. HOEBER, 1915.

In this little book Bulkley pleads for a more consistent and thorough trial of medical treatment of cancer. He attempts to show that not only is malignant disease on the increase, and this especially in the more civilized countries, but that its increase is coincident with greater consumption of certain food-stuffs, notably meat, alcohol, tea and coffee. He believes that the excessive use of these articles so disturbs the metabolic equilibrium of the body that cancer develops more readily.

The cases reported, though not all convincing, nevertheless leave the impression that perhaps more could be accomplished toward ultimate recovery if the medical treatment outlined by the author were used as an adjunct to surgical procedures.

There are many statements in the book that are made in a rather dogmatic manner and lack substantial scientific proof. For example it is stated on page 94 that "The saliva, and its action, constitutes a very important part in the process of digestion, and consequently of metabolism and the genesis of cancer." The portion of the book dealing with the urinary findings in cancer cases is open to similar criticism. When, as in cancer cases, there are growing in the body abnormal cells, why should the urine not show abnormal findings? To argue that the cancerous cells grow and multiply because of this disturbed metabolism revealed by the urine, seems somewhat far-fetched.

However, as we are dealing with a disease, the cause of which we do not know, and the cure of which we are at present unable to bring about, the methods of treatment advocated by the author should be given a fair trial together with surgical intervention.

THE EARLY RECOGNITION OF CANCER OF THE UPPER AIR PASSAGES.

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Nose: The need for the early recognition of cancer within the nose is the more urgent here when we briefly consider the effects of the ravages of the disease in its later stages.

In these later conditions we have not only the disease itself to consider, but its various effects on the economy. The presence of the new growth effectually hinders respiration; it causes most cruel, lancinating pain by pressure within the nose and the sinuses; in the stages of destruction there is a most foul and offensive discharge, and vision is often most seriously impaired, so that the poor victim eagerly awaits the end of his doom.

Very early in the disease it presents itself as a new growth, springing often from one of the turbinates, is easily differentiated from syphilis by our modern method of diagnosis, is readily removed by intranasal methods, and its progress may be carefully watched and treated; respiration being kept free during this time, adding to the patient's comfort and his powers of resistance the while.

It is true that in most instances the neoplasm is deep-seated, having its origin in one of the accessory sinuses, especially the antrum of Highmore, and by the time it appears in the nose it has already advanced too far for much help to be given. But even here with the early removal of a portion of the superior maxilla, life may be prolonged until the dread recurrence appears.

Those of us who have treated nasal conditions have seen how serious becomes the neglect of innocent intranasal growths which may metamorphose into malignancy. Fibromata have become malignant, and even adenomatous growths, polypi, have undergone sarcomatous metamorphosis. I have recorded such a case (*American Medicine*, August 2, 1902, p. 179), and because of its unusual character it is here briefly related:

W. K., male, aged 68, was referred to me because of interference with respiration which had long existed, and for which nothing had been done. His nose was bulging on each side, large polypi almost extruded from his nostrils, his hard palate bulged into his mouth, and the posterior nares were full of the same material. While he was mercifully free from pain, his sufferings from his impeded respiration and mucus and bloody discharge from his nose were very great. I performed tracheotomy under ether, then packed the posterior nares. An

incision along the outer side of his nose was carried to the median line, then down through the upper lip, and the nose was held over to one side. I then evulsed a mass of polypi which quite filled a half-pint Mason jar, and found most unusual osseous destruction. There was not a semblance of bony or cartilaginous nasal septum left, and all of the hard palate was gone. Careful suturing resulted in a minimum of scar, and in a short time the tracheotomy tube was withdrawn. The growth was found to be adenomatous tissue undergoing sarcomatous metamorphosis. The patient was comfortable until some two years later, when recurrence set in and death followed.

Such undoubted evidence should serve as a warning, as far as malignancy goes, against the neglect of the harmless nasal polypi.

Mouth: Here the most frequent site of malignant growths is on the tongue. Very often we have an early warning of the possibility of its occurrence in the presence of white patches on the tongue, gums, and cheeks, the leukoplakia buccalis. This leukoplakia may exist for many years, and while not always the precursor of cancer, it occurs so often that we must be on our guard, and view with the gravest alarm any induration of the tongue that may appear. Cancer may appear independently on the gums, cheeks, or floor of the mouth.

Pharynx: The tonsils occasionally undergo malignancy, as also the uvula and soft palate.

Posterior Nares: Cancer appears here in the form of a new growth or of a former innocent one become malignant. Its diagnosis is not always easy, as the only complaint may be some impediment to respiration and perhaps an added nasal twang to the voice.

All methods at our command may be required to localize the growth. The post-nasal mirror will help to reveal its presence and by careful measurements through the nose its extent may be definitely determined. This may be done by introducing a cotton-wrapped applicator through either side of the nose, and pushed well back into or to the nasopharynx and left *in situ*. A post-nasal examination will show the cotton if protruding into the pharynx and the outlines of the growth reasonably well determined. The naso-pharyngoscope serves well in the determination of the location and often of the extent of the new growth. Finally the finger may be introduced into the naso-pharynx, the density and the presence or absence of attachments digitally determined. Early removal with the galvanocautery snare has been successfully practiced.

Larynx: The epiglottis may be the seat of a cancerous growth, the early diagnosis of which is of supreme importance, as its complete removal is pos-

sible and the results are gratifying to the sufferer as well as to the surgeon.

I was fortunate in seeing the very inception of a cancer in the epiglottis, and as it was the first case of its kind ever operated upon in the manner described, and as there has been no recurrence in two and a half years, and no discomfort whatever following the removal of the epiglottis, the history is here briefly related (*Transactions American Laryngological Association*, 1913, p. 213):

Male, aged 64, first seen June 9, 1912, had slight pain in swallowing due to edema of the uvula. Had leukoplakia buccalis, no involvement of other parts. Again seen January 19, 1913. Condition the same. February 8, three weeks later, there was a thickened mass with deep ulceration in its center on the inner surface of the epiglottis. A portion removed showed cylindrical cell carcinoma.

February 20, under ether, the patient was suspended by the suspension laryngoscope and the entire epiglottis removed, cutting through healthy tissue only. He made a prompt recovery. Deglutition never interfered with after the first few days. Two and a half years have now elapsed and there has been no recurrence, and the patient is actively engaged in his daily duties.

Cancer of the larynx may occur at any part of the laryngeal interior, its favorite site being on one vocal or false cord. In the early stages it is limited to one-half of the larynx and its early recognition is imperative. From all that has been said on this subject the greatest hope may be held out to patients with a one-sided intralaryngeal cancer, if recognized early enough. Case after case has been recorded as definitely cured by such writers as Sir Felix Semon and Sir St. Clair Thomson in England, and Solis Cohen and Chevalier Jackson in America.

Trachea: Tumors of the trachea are rare fortunately, and we note that it may occur independent of those that may encroach upon the trachea from without.

Bronchi: Occasionally cancer occurs in the bronchi. In the light of our present knowledge the early diagnosis is of no great help to the patient, even though its steady encroachment may be seen.

I was consulted in May, 1911, by a patient aged 34, who complained of a whistling sound in her lung. All other methods failing to locate any cause, the bronchoscope was used. A small growth was seen in the upper bronchus and a piece removed which failed to show evidence of malignancy. An x-ray picture was then taken, the lungs being found apparently free.

She disappeared from observation until March, 1915, when she returned complaining of severe hemorrhages. Her whistle had disappeared, she said, after etherization and operation for hemorrhoids.

Physical examination now showed entire absence of vesicular breathing on the right side and a second x-ray picture showed complete absence of air

in the right lung due to a neoplasm in the upper bronchus. Careful methods of examination and comparison of former and present conditions were of exceeding value in this case as determining the insidious onset of the disease from the small growth to its present proportions.

Résumé: The early recognition of cancer in the upper air passages is of vital importance, as in many instances this recognition not only alleviates suffering, but is followed by complete cure, hence all these cases should be seen by someone who has made a study of diseases of the upper air passages, and who has made himself master of that most difficult and most important part of the treatment of all illnesses—diagnosis.

40 EAST FORTY-FIRST STREET.

THE EARLY DIAGNOSIS OF CANCER OF THE ESOPHAGUS.

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It is due to the combined efforts of experimenters and surgeons in Europe as well as here that we are to-day in possession of a useful method of excising a cancer of the esophagus, in the thoracic as well as the cardiac portion. We are, luckily, no longer groping in the dark. Removal of the proximal end of the resected esophagus from the posterior mediastinum and its transposition, antethoracically, under the skin of the left side of the chest (superior partial esophagoplasmy) represents the progress made. We have further learned that the work must be done in stages, either two or three.

Stage 1 consists in performing gastrostomy and making out, by careful and thorough palpation away up in the vault of the diaphragm, the local conditions at and around the cardia, particularly with reference to the mobility of the cardiac tumor, the presence and extent of glandular infiltration, etc.

If the esophageal growth is situated behind or above the aortic arch and there are no infiltrated glands at the cardia, the Beck-Jianu operation* appears at the present moment to be the preferable method, because it combines inferior partial esophagoplasmy with gastrostomy. Its mortality is not greater than that of gastrostomy according to one of the older methods. Of six such operations done to date I have had six recoveries.

In case the cancer occupies the lower portion of the thoracic esophagus, particularly if it involves the hiatus esophagus or the cardia itself, the Beck-Jianu gastrostomy cannot be done. Under such

*See author, *Annals of Surgery*, September, 1913; *Journal Am. Med. Assn.*, January 10, 1914, Vol. LXII, pp. 100-105; *Surgery, Gynecology and Obstetrics*, February, 1915, pp. 162-170.

conditions, the base of the new tube, formed from the major curvature of the stomach and transposed antethoracically from below upward under the skin of the chest, would enter or be close to the area infected by the carcinoma.

Whether after preliminary gastrostomy the radical extirpation of the tumor can be done in one or two sittings will be decided by the surgeon on the basis of the results of palpation at the time the gastric fistula is established, and by esophagoscopy. If the tumor occupies the cardia proper and esophagoscopy shows the upper limit of the growth to have invaded the esophagus at 38 cm. or more from the incisor teeth, one can hope to reach the healthy portion of the esophagus above the tumor from below. After cross division of the tube the esophageal transposition can then be accomplished by the extraction method of Kelling-Ach† at the same sitting.

If, on the other hand, a longer portion of the lower end of the esophagus has been invaded by the carcinoma, including the cardia, viz., if the distance of the upper end of the growth as measured at the time of esophagoscopy is 36 cm. or less from the incisor teeth, the operator cannot be sure of being able to pull the healthy portion of the esophagus down sufficiently into the abdomen to enable him to do good work from below. In such an event the operation will become a three-stage one.

Stage II will consist in thoracotomy; division of the esophagus above the tumor within healthy tissue; safe inversion of the distal end; extraction and transposition of the proximal (oral) stump downward through an esophagotomy wound made at the neck.

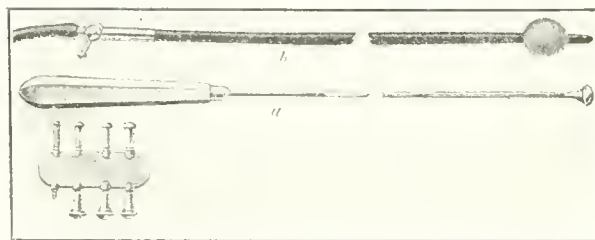
Stage III: Removal of the tumor from below after the stomach has been divided transversely and its distal portion closed, the remaining pouch being in communication with the gastric fistula.‡

This is not the place to enter into further operative details. The course of the operation as such has been briefly outlined. This was necessary in order to show that the first of the two factors essential for a successful issue of the resection of a malignant esophageal stricture—no matter in what part of the esophagus it be found—namely, the knowledge of "*how to do the operation*," is an accomplished fact to-day. Of course, changes and modifications will become necessary as we go on.

The second factor in bringing about a successful

issue of esophageal resection consists in the possibility of establishing an early diagnosis of cancer of the esophagus, the subject to be briefly discussed in this article.

Patients who suffer from difficulty in swallowing usually consult the internist first. It is he, then, first of all, who must thoroughly familiarize himself with this question. He, still more than the specialist, must be fully imbued with the importance of the dictum: A patient who complains of trouble in deglutition that has come on gradually, without his having accidentally swallowed any acid or caustic lye, and is steadily increasing, is a surgical case. Just as the general practitioner who keeps abreast with the times considers it to mean "playing with human life" if he treats a case of acute appendicitis expectantly instead of promptly calling in the surgeon, just so must he recognize that delay



(a) Callman's esophageal sound with mushroom tip. (b) Schreiber's esophageal sound for retrograde exploration. The collapsed bulb is filled with water after it has reached the stomach. (c) Interchangeable tips for Callman's sound, representing sizes 15 to 36, French gauge, the increase being 3 millimeters each. (From "Surgery, Gynecology and Obstetrics.")

in establishing the definite diagnosis in the presence of symptoms of obstructed deglutition, is inexcusable and may mean death to the patient, for it has been shown that in at least 80 to 90 per cent. of these cases the trouble is due to carcinoma. Medical treatment of esophageal carcinoma has, of course, a mortality of 100 per cent. Surgical treatment, i.e., operation, it is true and fully recognized, cannot boast of much better results at the present moment. Still, it represents the only chance the patient has, since medical treatment offers none; and certainly the last months of life of a patient afflicted with cancer of the esophagus, or cardia, or lesser curvature of the stomach, are pitiful. To watch these unfortunates die inch by inch is as distressing for the medical attendant as it is terrible for the patient.

On the other hand, operative methods as worked out to-day certainly offer him a chance. Hence, it would seem that a discussion as to the propriety of surgical attack in cases of esophageal carcinoma is out of place at this time. That question has been definitely settled in favor of surgery, I think. The successful cases of operative recovery reported by

†G. Kelling. *Centralblatt f. Chirurgie*, 1904, No. 20, p. 612; and A. Ach. *Beiträge z. Oesophagus Chirurgie*, Munich, 1913.

‡It is possible that further evolution of this subject will let us do the entire operation, inclusive of gastrostomy, in one sitting, at least as far as carcinoma of the cardia is concerned. For resection of the thoracic portion of the esophagus the two-stage operation, doing gastrostomy in the first, offers great advantages.

Völker, Kümme, Sauerbruch, Zaaijer, Ach, and Torek have proven the clinical possibility of recovery. The next decades will see the methods of operation as thoroughly established as those in abdominal surgery. Be it remembered that carcinoma of the esophagus, more specifically the squamous-celled epithelioma, is the most benign of all malignant growths occurring in the entire gastro-intestinal tract. It remains locally confined for a comparatively long time, infects the glands at a late period and metastases appear only in the advanced stage of the disease.

May the first point, the foremost one, then be repeated and emphasized once more: Every patient who complains of difficulty in swallowing is to be considered a surgical case. If the medical man, the family physician or specialist, does not have at his disposal the various methods of examination, immediately indicated and necessary for differential and refined diagnosis, he should consider it his duty to refer the patient without delay to such institution where he knows the necessary steps will be carried out. This, of course, does not mean that he should not familiarize himself with everything pertaining to the establishment of the differential diagnosis. But in the present advanced stage of clinical examination, it is absolutely impossible for any one man to command all the methods of examination that have to be resorted to in this class of cases. He therefore must of necessity consult others. The more quickly he does this, the better for the patient.

The Method of Examination: These are enumerated as they seem to me that they ought to be carried out:

1. *Radiography*, particularly stereoscopic radiography with fluoroscopy, deserves first place, for its results are definite, clear and convincing. It may render superfluous other methods of examination. In advanced cases a definite stricture is shown. It is plainly seen by fluoroscopy how the bismuth meal was forced to pass a narrow lumen, if it could pass at all.

For roentgenologic recognition of the early stages of the disease the efforts of A. C. Crump and William H. Stewart, of New York, and of Hessel, Kreuznach, Germany, have paved the way for success. They make the patient swallow or introduce drawn over a bougie a casing which is closed at its lower end and filled with bismuth paste, after it has passed the suspected stricture. The tumor, even in its beginning, will show an irregular line of the esophagus wall in place of the otherwise perfectly straight one, as found, for instance, above a benign stricture.

2. *Sounding:* To make it a rule, as is done al-

most everywhere to-day, to precede x-ray examination by sounding, seems unwise. A thoracic aneurism may have caused the esophageal obstruction by compression from without. Its clinical signs, as made out by palpation and auscultation, may be insignificant, and yet it may be ready to perforate into an internal viscus, one of the many to which it may have become adherent. Just think, if such a perforation should occur at the doctor's office right after sounding! It certainly appears wiser to have sounding *follow* radiography.

Esophageal sounds have been greatly improved in the course of recent years, which is important to early diagnosis. The old olive tip sound should be discarded, although it retains its usefulness in advanced cases. In early cases Callmann's and Schreiber's instruments are preferable, particularly the former (see illustration). Both are used to best advantage by retrograde exploration (Cf. author, *Surg., Gyn. and Obst.*, Dec., 1913).

3. *Esophagoscopy:* This should be done by a specialist. He must be so thoroughly trained as to reassure the surgeon or internist that his examination will not complicate the patient's condition in any respect.

The question whether a small piece of the esophageal wall, when it appears pathologically changed, should be extirpated for microscopical examination *in every instance*, has not been settled as yet. In a beginning tumor the branches of the biting forceps may cause perforation; if used too superficially the specimen may show nothing.

4. *Exploratory Thoracotomy:* This operation takes the same place in the surgery of the thorax as exploratory laparotomy does in abdominal surgery. It has been definitely proven that, under differential pressure, it can be carried out with the same degree of safety as the latter.

Of course, everything must be ready for the surgeon to resect the tumor right then and there should exploration show the presence of a malignant growth.

The Various Alternatives that come into consideration when diagnosing the case of a patient complaining of difficulty in swallowing are the following:

1. *Pressure diverticulum of the esophagus*, as it is not infrequently found at its cervical portion, at a level with the jugulum. The history of the case (duration of dysphagia); radiography (in no disease has this shown more brilliant results); and sounding, will determine its presence.

2. *Cardiospasm:* The same diagnostic means as mentioned under 1, plus esophagoscopy, will determine the cause of the complaint.

3. *Narrowing of the lumen of the esophagus by pressure from without* (swollen glands, aneurism, tumor of the mediastinum, exudate within the pericardium). Clinical examination plus radiography will prove to be deciding factors as regards the differential diagnosis.

4. *Cicatricial stricture*: The history of the case will at once bring out whether such alternative has to be considered. Sounding will establish its presence and esophagoscopy will corroborate it.

5. *Ulcers of the cardia* (tuberculous, syphilitic, peptic). All three are rare. It is self-understood that the necessary clinical examination will be done in every case in order to enable one to exclude or include their significance.

6. *Carcinoma*: As to frequency, carcinoma is at the head of the list of alternatives. As stated above, the cause of slowly increasing difficulty in deglutition after the 20th year of age, in male as well as female patients, is cancer in 80 to 90 per cent. of all cases. This fact makes the diagnosis very much easier, for we have the right, on the basis of such knowledge, to consider every case of esophageal stricture *suspicious of carcinoma*, after one single question, put to the patient, has ruled out a benign stenosis due to the swallowing of a caustic.

Thus it is seen that no special difficulties exist at the present time to prevent us from making a definite diagnosis in cases of esophageal obstruction even in its early stages.

In view of the great interest to-day shown by so many medical men in this chapter of surgery, it is to be hoped that the day is not far distant when these patients will be given the benefit of an early diagnosis, and therewith a growing chance of a cure.

DELAYS IN CANCER TREATMENT.

The key to the reduction of cancer mortality lies precisely in this: That cancer always begins as a purely local disease involving a strictly limited area; second, that this limited area is accessible in about four-fifths of all cases; and third, and most important, a commencing cancer practically always indicates its presence when it is still in its early, locally limited, and permanently curable stage. In other words, the enemy that we have to fight is not the cancer, but the delay. Nearly 60,000 of our people die every year not because they have cancer, but because they have waited till the cancer became incurable.—*Penn. Med. Society Cancer Commission*.

Bursting open of the abdominal wound happens sufficiently often in cases of gastro-intestinal cancer to make desirable the employment of linen sutures in the fasciae.

THE EARLY DIAGNOSIS OF CANCER OF THE STOMACH: A STUDY OF 921 OPERATIVELY AND PATHOLOGICALLY DEMONSTRATED CASES.

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There is no authentic instance of histologically demonstrated gastric cancer having been cured by non-surgical procedure.

The experience of the surgeon has established the fact that the operative cures of cancer of the stomach have been achieved in those instances of the disease where the neoplasm was so localized as to permit its total excision.

The surgical pathologist familiar with the histologic appearance of recently removed tissue has proved that the greatest number of operatively cured cases of gastric cancer occurs in that group where the diagnosis of malignancy was possible by no other means than by high-power examination of tissue excised from the stomach wall. The early diagnosis of malignancy in these curable cases rested upon the histologic demonstration of intracellular progressive nuclear hypertrophy (functionally) differentiated gland cells, atypical architecture of gland elements, hyperplasia of exuberant gland groups, and invasion of hyperplastic, undifferentiated, epithelial cells into non-epithelial portions of the gastric wall. The cases which derived the maximum benefit from operation were those in which the fewest areas of malignant, epithelial hyperplasia were found, or those where active, gland-cell hyperplasia existed to such an extent as to permit of but a presumptive diagnosis of cancer, histologically.

Findings of the above type occurred with the greatest frequency in specimens of tissue removed from patients in whom the disease seemed, clinically, surgically, and upon gross pathological study, calloused, gastric ulcer.

It is now possible to state that much of the burden of the early diagnosis of gastric cancer rests upon the observations of the skilled surgical pathologist; that such diagnosis is best made from careful study of the histologic variations occurring in recently extirpated tissue; that the malignant departures from the normal are least evident in tissue removed from subjects whose gastric history has been that of recurring, peptic ulcer, and in whom the ailment appeared to be but ulcer of this kind, to both the eye and the hand, at laparotomy. These

ulcers are commonly greater than one cm. in diameter.

While these recently established facts impose a new responsibility upon the pathologist, it should be emphasized strongly that the laboratory worker is dealing with a picked material; the segregation of patients must be made by the clinician, internist, and surgeon. The patient's fate depends in direct ratio upon the completeness of the cooperation existing amongst the three. In their hands, likewise, rests the problem of substantially reducing the mortality of the race from gastric cancer. As an attempt to further this object, I present, briefly, certain facts derived from a clinical study of my records of 921 operatively and pathologically demonstrated instances of cancer of the stomach. These cases were tabulated mainly from my services at the Mayo clinic and at Augustana Hospital.

I.—FACTS DERIVED FROM CLINICAL HISTORIES.

1. Etiologic:

(a) *Sex*.—In the series there were 693 males and 228 females, a ratio of rather more than 3:1. This proportion is particularly interesting in view of the observations of other clinicians, viz.: Brinton (1859), males to females as 2:1; Fox (1872), approximately equal ratio of incidence between the sexes; Welch (compilation from many non-related sources), males to females as 5:4; Fenwick (1903), males to females as 6:4, and Friedenwald (1913), 588 males to 412 females (26.6 per cent. only of his cases came to laparotomy). The proportion returned by my series is particularly interesting because it is returned from a controlled material; it is distinctly an American experience and the ratio closely approximates that existing between the sexes when affected by benign, chronic, peptic ulcer.

(b) *Age*.—Between the ages of 40 to 69 occurred 84.9 per cent. of all our cases. Nineteen instances (2.6 per cent.) were recorded below the age of 31. In males nearly 41 per cent. of cases occurred in the sixth decade; in females the disease was most common in the fifth decade (32 per cent.).

(c) *Occupation*.—Approximately one-third of the patients were from farms or rural communities. There appeared to be no other significant occupational pointings.

2. Clinical History:

The material groups itself quite sharply under the following symptom-complex heads:

(a) *Gastric cancer in individuals who came to laparotomy for clinically benign gastric ulcer and in whom cancer was diagnosed microscopically from extirpated tissue.*

In this group there were 72 cases (7.8 per cent.).

The symptomatology of the group is typified by the following history:

No. 31,598.—Mr. F. B., age 53, farmer.

Family History.—Negative.

Personal History.—Denies venereal disease; married; two children; wife has had no miscarriages; measles at 12; never used tobacco or alcohol; always worked hard.

Digestive History.—For the past fifteen years has had attacks of "stomach trouble." Up to six months ago these came on two or three times a year, being especially aggravating towards the Christmas holidays. The attacks consisted of ache or colics in the right upper abdominal quadrant or towards the rib edges. They would come on three to four hours p.m. or at night and last until he ate something or forced himself to vomit. His appetite was generally good, but he limited his eating at such times. Between the "spells" of dyspepsia he was perfectly well. Six months ago began to have rather constant distress accompanied by acid eructations and some nausea. Appetite became less sharp. One night while unlacing his shoes he felt "queer," and soon afterwards vomited about a pint of red blood. Was in bed a week; then felt fairly well except for soreness in the pit of his stomach. Since the hemorrhage has felt moderately comfortable except for some weakness. Appetite has been a bit capricious. Bowels, which were formerly constipated, have been loose for past two weeks. Never noted blood. Thinks he is about 15 to 20 pounds underweight.

Status Praesens.—Moderately well nourished, lanky male; sclera clear; tongue large and coated heavily; teeth poor and dirty; *fetor ex ore*.

Neck and Chest.—Negative.

Abdomen.—Somewhat full in epigastrium; tenderness with muscle spasm in right upper quadrant and at right rib margin; nothing abnormal palpated. *Rectal examination* negative.

Blood.—Hemoglobin 85 per cent. (Tallquist); red blood corpuscles, 5,340,000; white blood corpuscles, 7,000.

Test-Meat.—Total acidity 44; free hydrochloric acid 28; combined acids and acid salts 10. No 12-hour retention.

Stool.—Trace of blood (Benzidin) on milk diet.

Laparotomy.—Calloused ulcer size of a half dollar on lesser curvature in antral region; edges thickened; base clean; no enlargement of perigastric lymph-glands; stomach moderately dilated.

Operation.—Mikulicz-Hartman-Billroth No. 2, with posterior gastro-enterostomy.

Pathologic Report.—Early carcinoma of glands of edge and base of ulcer. Numerous areas showing epithelial wandering through basement membrane. Extensive round-cell infiltration.

(b) *Group 2—Gastric cancer, which had developed in individuals with long-term, antecedent dyspepsia of the type commonly recognized as peptic ulcer, in whom malignancy subsequently appeared.*

There were 436 (47.3 per cent.) of our cases falling into this group. The clinical picture is represented by the summary which follows:

No. 25,862.—Mr. A. L., age 52, carpenter.

Family History.—Negative.

Personal History.—Married twice; first wife died of tuberculosis.

Present Trouble.—Periodic dyspepsia from 18 to 21 years of age; this consisted of epigastric pain, sour eructations and belching, and occasionally vomiting of sour fluid. At age 22 vomited about a pint of blood; was in bed two weeks; since then has had only rare attacks of the dyspepsia until 17 months ago. He then began to have pain in the epigastrium. This was a gnawing and sore feeling and was worse about two hours after eating. Shortly afterwards he began to vomit. Recently has had night pain, with vomiting about one o'clock in the morning. He frequently vomits up what he had eaten for breakfast and occasionally material eaten the day previously.

Weight Loss.—50 pounds in six months.

Physical Examination.—Much emaciated; sallow com-

plexion; skin dry; weak and tired looking; tongue coated; thorax negative.

Abdomen—Moderately distended; small umbilical hernia; inguinal glands moderately enlarged. Percussion dullness in flanks—movable. No abdominal tumor palpable. *Rectal examination*—negative. *Liver and spleen*, not enlarged.

Laboratory Examinations:

Blood—Hemoglobin 82 per cent.; red blood corpuscles 4,980,000; white blood corpuscles 6,200.

Test-Meal—Total acidity 28; free hydrochloric acid 12; combined acids 8. Altered blood plus. Moderate 12-hour retention. Microscopically—Oppler-Boas bacilli. Yeast plus.

Stool—Altered blood plus (benzidin test). Schmidt highloride test—Bilirubin.

Laparotomy—Long right rectus incision. About 2,000 cc. of sero-fibrinous peritoneal fluid. Large carcinoma involving greater curvature, with extension into pancreas. Secondaries in liver.

Operation—Exploratory.

Pathologic Report—Gland removed shows adeno-carcinoma.

(c) *Group 3*—Gastric cancer in individuals who prior to the onset of a malignant gastric malfunction had experienced perfect gastric health.

This group furnishes the common "text-book" type of gastric cancer. In our series this class included 294 cases (31.9 per cent.). A specimen of the clinical course of the disease in this group is furnished by the summary following:

Mrs. A. D., age 46, housewife.

Family History—One sister died of "quick consumption."

Personal History—Pleurisy five years ago; lumbago for many years; otherwise well.

Present Illness—"Indigestion" for past two and a half years; this has been characterized by pain in mid-epigastrium constantly present and of gnawing character, pain transmitted to back between shoulders. Pain has been constant and not relieved by diet, medicine or posture.

Nausea—A marked symptom, prostrating and comes on any time of day or night, worse when lying down.

Vomiting—For the past month vomiting after every meal. Vomitus contains food, but no blood. Never bad taste. Vomitus watery, never colored. Relieves some of the distress. Been on liquid diet, but no relief.

Belches gas constantly; never sour; no relief by soda.

Constipation—Marked; never blood.

Flatulence—Marked.

Weight Loss—24 pounds in two years.

Genito-Urinary—No urinary symptoms; menopause one year ago.

Physical Examination—Fairly well developed and nourished; moderate pallor.

Tongue—Slightly coated.

Head, Neck and Chest—Negative.

Abdomen—Diastasis of recti muscles with dilatation of superficial cutaneous veins. Just above navel is a semi-lunar, freely movable mass 12 cm. long and 5 cm. wide, not tender; can be displaced up and down, but not free from side to side. Tenderness over gall-bladder.

Vaginal—Perinum lacerated.

Laboratory Examinations:

Blood—Hemoglobin 70; red blood corpuscles 4,200,000; white blood corpuscles 7,800.

Test-Meal—Resistance to tube at cardia; no bleeding. Slight 12-hour retention. Total acidity 24; free hydrochloric acid 2; combined acids 18; lactic acid; altered blood (guaiac test). Wolff Junghans' test for soluble albumin (more than 200 units). Glycyltryptophan test. Formal index 22 (Sorensen-Schiff method). Microscopic examination—Few bacilli of Boas-Oppler type.

Stool—Altered blood (benzidin test).

Laparotomy—Pylorus and entire less curvature carcinomatous. Stomach thickened, small (leather bottle type).

Operation—Exploratory.

Pathologic Report—Gland shows carcinoma.

(d) *Group 4*—Gastric cancer in individuals in whom malignancy followed previous gastric disturbance of no definite clinical type, gastrically.

Eighty-four patients (9.12 per cent.) made up this group. The digestive upset apparently of benign type which preceded the period of clinical malignancy, varied greatly in its manifestation, but the following summary is a fair representative of the group:

Mr. C. L., age 48, engineer.

Family History—Negative.

Personal History—Usual diseases of childhood; had pneumonia three times—40, 14 and 7 years ago; had typhoid fever 35 years ago; claims to have had three attacks of appendicitis—one 53 years ago, one 56 years ago, and one 6 years ago, in bed each time from 5 days to 2 weeks; had seven attacks of severe la grippe. Denies venereal disease.

Present History—Three months ago was taken with severe cramp in lower abdomen immediately after eating; it lasted fifteen minutes. Twelve hours later again very severe cramp with nausea. No chills, fever, sweats or jaundice. Since then patient has constantly had hard epigastric ache with nausea, water-brash and eructations. Vomits immediately after eating and frequently vomitus contains food eaten 24 to 48 hours previously. Never vomited blood or noted dark stools.

Appetite—Fair.

Bowels—Constipated.

Weight Loss—20 pounds in two months.

Physical Examination—Emaciated; anemic; skin dry and scaly; past maleolar edema; no adenopathy.

Eye Reaction—Normal; eye grounds negative.

Tongue—Coated.

Thorax—Apices rather dull to percussion.

Heart—Slightly enlarged; second aortic tone roughened. Moderate arterio-sclerosis.

Abdomen—Visible peristaltic waves running from left to right in region of navel.

Stomach—By percussion reaches almost to symphysis. No tumor palpable. Resistance in right upper quadrant to deep palpation.

Laboratory Examinations:

Urine—Trace of albumin.

Blood—Hemoglobin 40 per cent.; red blood corpuscles 3,060,000; white blood corpuscles 9,000.

Test-Meal—Marked 12-hour retention. Total acidity 84; free hydrochloric acid 12; combined acid 38; lactic acid plus. Altered blood (benzidin test). Microscopic examination—Great numbers of Oppler-Boas bacilli; colonies of yeasts.

Stool—Altered blood (benzidin test).

Laparotomy—High right rectus incision; Gall-bladder six times normal size; adherent to omentum and contains several large stones. Stomach dilated. Carcinoma involving pylorus and antrum with marked stenosis. Appendix adherent to anterior abdominal wall. Glands along lesser curvature carcinomatous.

Operation—Posterior gastro-enterostomy; separation of adhesions; appendicectomy; cholecystostomy.

Pathologic Record—Gland, carcinoma.

(e) *Group 5*—Gastric cancer in individuals who presented few clinical evidences of a malignant disease primary in the stomach.

There were nineteen such cases (2.1 per cent.) in the series. While these patients, clinically, were apparently affected by some grave disorder, the symptoms did not pain especially to gastric involvement. Exploratory laparotomy was necessary to make certain the location and the type of ailment. The following history summary is representative of the group:

Dr. C. H. B., age 59, physician.

Family History—Negative.

Personal History—Usual diseases of childhood; rheumatism age 12; amputation lower right leg age 14 (accident); maxillary sinus infection for the past 15 years; typhoid fever age 25. Denies venereal.

Present Illness—Perfectly well in every way until five months ago; after a period of overwork noted distention of bowels with gas. This was relieved by lying down. The distention occurred only on an empty stomach. During the past month has had several attacks of unexplained nausea accompanied by epigastric distention.

Appetite—Fair.

Bowels—Normal until one week ago, when patient began to have diarrhea; a slight excess of mucous noted in the stools, but no blood.

Weight Loss—Thinks he may have lost about 10 pounds during past year.

Habits—Careful eater; smokes occasionally; drinks two or three ounces of whisky every two or three days.

Physical Examination—Fairly well nourished; somewhat pale; apparently somewhat underweight. Skin dry; somewhat pale; tongue coated.

Thorax—Negative.

Abdomen—Moderately distended, particularly over the colon. In the epigastrium is a sensation of deep resistance without actual pain or tenderness. Auscultation, gurgling sounds over infra-navel region.

Rectal Examination—Moderately enlarged prostate.

Test-Meal—Stomach tube meets resistance just below the cardia, and upon gastric lavage numerous blood clots were in the wash water; gastric extract cream colored, somewhat sour odor and showed food poorly chymified. There was no gastric retention. Total acidity 18; free hydrochloride 0; lactic acid trace; altered blood plus. Wolff-Jungmans test 200 units plus.

Microscopic examination of unfiltered gastric extract revealed Oppler-Boas bacilli, great numbers of streptococci, many short, fat rods and numerous erythrocytes.

Stool—Diarrheic type containing much undigested food of all kinds. Benzidin test for blood trace.

Fluoroscopic Examination—Esophagus patent; no obstruction at the cardia; stomach in good position, fair size; gaping pylorus with prompt visualization of the duodenum. In the pars-media there is a large filling defect involving both curvatures and apparently extending posteriorly into the pancreas, causing the stomach to be fixed in its middle third.

Blood Examination—Hemoglobin 70 per cent.; reds 4,300,000; white cells 8,900.

Laparotomy Findings—Infiltrating tumor the size of new-born infant's head on the posterior wall of the stomach in the pars-media involving the pancreas by direct extension; moderate enlargement of perigastric lymph glands.

Operation—Exploratory.

Pathologic Report—Small gland removed shows carcinoma.

(f) Group 6—Gastric cancer secondary to extra-gastric malignancy.

There were sixteen cases (1.7 per cent.) of this type in our series. Secondary gastric growths most commonly followed malignant disease of the breast, female genitalia, gall-tract, or pancreas. In such instances, it was not infrequently impossible to localize the primary process before laparotomy. The following summary is representative:

Mrs. S. E. H., age 56, housewife.

Family History—Negative.

Personal History—Typhoid fever age 30. Operated upon five years ago for gall-stones. Two years ago had carcinoma of the uterus removed (radical operation).

Present Complaint—Perfectly well gastrically to one year ago, then noted dull pain below the left costal arch; this came on usually when the stomach was filled and lasted several hours. The pain was accompanied by burning sensations in the throat and mouth, water-brash and

disagreeable taste. Never nauseated or vomited. Pain and distress were relieved by limitation of diet and by the taking of milk of magnesia.

Appetite—Has been fair.

Bowels—Regular.

Weight Loss—15 pounds in past six months.

Physical Examination—Tired looking, somewhat anemic female, moderately well nourished.

Teeth—Poor; marked pyorrhea.

Neck and Thorax—Negative.

Abdomen—Low median well healed scar. In the right epigastrium on deep palpation is a small ridge which can be moved slightly beneath the fingers.

Rectal Examination—Nodules (?) in cul-de-sac.

Urine—Negative.

Stool—Negative.

Fluoroscopic Examination—Moderate dilatation of the stomach; at the pylorus there is a filling defect involving the pylorus and the greater curvature of the antrum. The duodenum is visualized irregularly. There is no six-hour retention of bismuth.

Test-Meal—Slight 12-hour food retention; free hydrochloride 20; no blood.

Laparotomy Findings—A hard nodular infiltrating mass involving the pylorus and antrum.

Operation—Pylorotomy, posterior gastro-enterostomy.

Pathologic Report—Carcinoma.

3. Hemorrhage:

Macroscopic.—Of the whole number of cases making up the series, gross evidences of bleeding were recorded in 170 cases (18.5 per cent.). Of the whole number bleeding 17.4 per cent. had had hematemesis or melena at least two years before coming under observation. In the large majority of instances where such early bleeding had been noted, the precarcinomatous history conformed to that which we interpret clinically as chronic peptic ulcer.

Chemical Test for Blood.—In the gastric extracts such were positive in rather more than 78 per cent. of instances by the guaiac or benzidin method. The stools examined upon a meat-free diet in 380 consecutive cases gave positive chemical blood tests in rather more than 82 per cent. of cases.

The interpretation of chemical tests for blood in stools must be carefully guarded. In those instances where there is a slowly progressing malignant ulcer, benzidin or guaiac tests are apt to be only intermittently positive. Given an ulcer history the persistent demonstration of altered blood in the stools is a fair indication that malignancy is highly probable. In this way it is readily seen that positive occult blood tests are of greater service in informing us with respect to the character of a peptic ulcer than in merely demonstrating that gastric ulcer exists. It would thus appear that chemical tests for blood in the properly prepared stool furnish a valuable and early diagnostic sign in gastric cancer. This is especially significant when it is remembered that ulcera carcinomatosa are the most amenable to surgical treatment. In cases where gastric cancer was well advanced, chemical tests for blood were positive in nearly 83 per cent. of instances. Of course, when this finding was noted, other evidences of gastric cancer were usually not lacking.

4. Vomiting:

This is generally due to a persistent mechanical fault in the emptying power of the stomach. It may have been preceded by a long period of nausea. The mechanical hindrance to the passage of food from the stomach most commonly occurs earliest as a consequence of varying grades of stenosis associated with chronic peptic ulcer. In this type of case, vomiting is intermittent or persistent in nearly three out of four instances. This clinical hint, particularly if it is associated with history of ulcer dyspepsia in a patient at the cancer age, should point to prompt surgical procedures. Such radical measure often leads to the actual demonstration of early gastric cancer and permits of its complete extirpation. When cancer has become far advanced vomiting is a prominent symptom in nearly 80 per cent. of cases. The vomitus in such instances is apt to be tan brown in color, cheesy or rancid in odor, to contain chunks of poorly chymified food, and to be particularly copious.

II.—FACTS DETERMINED BY PHYSICAL EXAMINATION.

(a) *The Abdominal Tumor.*—In instances of gastric cancer where the diagnosis rests upon microscopic examination of extirpated tissue, but rarely it is possible to demonstrate epigastric tumor. The few cases where ridges or suspicious indurations are made out occur in conjunction with chronic, perforating ulcers of malignant type, associated with exuberant scar tissue proliferation. There were 312 individuals (33.7 per cent.) in our series of gastric cancers where no abdominal tumor was present before laparotomy. In this class occurred the highest percentage of operative cures. There were 609 cases (66.2 per cent.) where abdominal tumor or ridge was definitely made out at the first examination or after inflation of the stomach with air. In rather less than one-third of such instances were the surgical advantages of localization of the disease present at laparotomy. From these facts it is quite evident that diagnosis early enough to be of service to the patient must usually be made before it is possible for him or his physician to recognize an abdominal mass. In about 9 per cent. of well advanced gastric cancers abdominal tumor cannot be made out. These are usually growths located at the cardia, high on the lesser curvature, at the fundus or on the posterior wall. Where the neoplasm is of the diffusely infiltrating type (colloid or schirrhous), the abdominal wall tense or the peritoneal sac distended with free fluid, even extensive gastric cancers with metastases may not be associated with palpable abdominal tumor.

The location of the abdominal tumor.—In our

series, the palpable nodule or mass was located in the epigastrium in 85.7 per cent. In 86 instances (13 per cent.) the growth was demonstrated in the region of the navel or at about its level. Only eight times (1.4 per cent.) was the tumor observed below the level of the navel.

Relation of the position of the palpable abdominal tumor, with regard to the part of the stomach involved.—Our study shows that 66.7 per cent. of the neoplasms involved the pyloric region, the antrum, and the pyloric half of the lesser curvature. Approximately eight out of ten such growths were palpated before laparotomy. In 12 per cent. the greater curvature had been invaded. In such event nine out of ten of the tumors were palpable. The posterior wall was the seat of the disease in 9.3 per cent. In this group, the tumor could be felt externally in but five out of ten instances. The anterior wall was involved in 2.3 per cent. These tumors were palpable in nine out of ten instances. In 3.5 per cent. of our cases the neoplasm was at or near the cardia; but three out of ten such tumors were palpable. The greater curvature was involved in 2.3 per cent., and of these growths six out of ten were palpable. In this series, none of the tumors involving the fundus was palpable, but in such cases dullness on percussion was generally definite in Traube's semilunar space. Some part of the multiple tumors forming 2.9 per cent. of the group were palpable in nine out of ten instances.

The size of the abdominal tumor that is palpable varies greatly. *Ulcera carcinomatosa* may be felt only as narrow, finger-like ridges or as small nodules, even after the stomach has been inflated with air. Beginning, primary gastric cancers range in size on palpation from that of a common marble to that of a lemon. When the tumor has progressed for some time it may be as large as a child's head, a medium-sized squash, or a discus. The tumor may fill the entire epigastrium and extend well into the left flank. It may be so large as to simulate a leukemic spleen. If invasion of the liver, pancreas, or adjacent hollow viscera has taken place, a huge, irregular, or plaque-like mass may occupy the entire upper abdomen. Rarely does the growth extend below the navel, but if the omentum is involved, the tumor may seem to be so extensive as to cast doubt upon its being primarily of gastric origin.

(b) *Abdominal Tenderness.*—This is apt to be most marked in *ulcera carcinomatosa*. The area of tenderness is most commonly situated in the epigastrium between the right nipple line and the left parasternal line. Definitely circumscribed spots of maximum tenderness are not infrequently deter-

mined, but most commonly there is present diffuse epigastric regions of distress upon palpation. Where there has been early invasion of the peritoneal coats the palpating fingers often have conveyed to them a peculiar sensation of deep resistance. Over such an area there is not rarely dullness upon percussion.

In well advanced cancer, the abdomen or the tumor proper is not commonly very tender upon palpation, unless perforation or extensive ulceration has taken place. Very often a tumor may be moved about freely without causing the patient much discomfort.

(c) *Weight Loss*.—In ulcera carcinomatosa the weight loss may be unnoticed for months. There may be slight losses followed by definite gain for a long period. Ultimately, however, the drop is steadily maintained and its rate accelerated. The average weight loss in the stage definitely ulcus carcinomatosum in this series was nearly 17 pounds. When frank malignancy had become established the average loss was more than 26 pounds. In the type of case which from its inception is definitely malignant, steady weight loss is the rule. There are few instances in this group where treatment other than surgical is accompanied by gain in weight maintained for any appreciable length of time. Persistent weight loss in an individual over 40 years of age who has been a chronic dyspeptic, or who has recently become affected with persistent gastric upset, demands that gastric malignancy be excluded before any other diagnosis can be seriously considered. The average weight loss in our cases of primary cancer was 31 pounds.

(d) *Cachexia* is a late manifestation in gastric cancer. When pallor, definite anemia, physical weakness, mental lassitude, and loose, dry skin, with or without edema about the malleoli, are noted, the cases are hopelessly involved by the neoplasm in more than three out of four instances. Cachexia is rarely a sign of definite note in early gastric cancer, whether such growth follows a previous, long-term dyspepsia or has arisen abruptly from what we are apt to consider a healthy gastric mucosa. The diagnosis which requires evidences of systemic cancer poisoning for its substantiation is only of interest so far as personal satisfaction is concerned. Early fatal termination of the case can usually be safely prognosed. In these instances, palliative operations only are possible.

III.—FACTS DETERMINED BY LABORATORY METHODS.

(a) *Test-meal Analyses*.—Persistent interference with the free emptying power of the stomach is a sign of great worth in the early diagnosis of

gastric malignancy. It indicates at once a mechanical fault that cannot be permanently treated by non-surgical procedures. If the individual in whom such interference to free gastric emptying has been affected with a chronic dyspepsia, and that dyspepsia has been clinically of the ulcer type, one must consider that he is dealing with a condition which is potentially cancer, if not actually so. In this very group of cases, surgical exploration reveals the greatest percentage of early gastric cancers, and from this class are returned the greatest number of permanent cures of the disease.

Proof of gastric emptying power should always be determined by the administration of a mixed meal consisting of a liberal allowance of ordinary food. Meals of the pap variety are of practically no value in determining gastric emptying power. The persistent demonstration of test-food remnants in a stomach after from eight to twelve hours means a mechanical fault.

In our gastric cancer series, gastric emptying power was interfered with in nearly 71 per cent. of instances. Food stagnation was demonstrated in approximately 10 per cent. more frequently in instances of the disease that had been shown to be malignancy following long-term, clinically benign dyspepsia.

Gastric acidity estimations are of considerable worth if properly interpreted. The quantitative fluctuations in free hydrochloric acid are of greater value prognostically than diagnostically. A carelessly compiled literature has conveyed the impression that gastric cancer and absent or low free hydrochloric acidity go hand in hand. As a consequence not a small portion of the mortality from cancer of the stomach can be traced to the physician's persistently treating the dyspeptic medically until free hydrochloric acid has entirely disappeared—and with it the patient's chance for cure.

In but 52.4 per cent. of our cases of gastric cancer was free hydrochloric acid absent from the removed test-meals. Where free acid was present, it ranged from a trace to as high as 160. Approximately one out of five cases had free hydrochloric acidity between 20 and 50.

In inoperable, ulcerated, primary gastric cancer, the average free H.Cl. was 2.4. The average total acidity was 28.

In inoperable gastric cancer without gross evidences of ulceration, the average free H.Cl. was 6.4. The average total acidity was 28.

In ulcera carcinomatosa (commonly operable, with a high percentage of permanent cures), the average free H.Cl. was 31. The average total acid-

ity was 48. These figures closely resemble those returned from the analyses of gastric extracts from instances of chronic peptic ulcer, even when interpreted in the light of clinical history. However, in a given case, the progressive lowering of the free H. Cl. and a corresponding increase in the combined H.Cl., associated with permanent interference with the gastric emptying power and the persistence of altered blood in the properly prepared stool, necessitates the advice that laparotomy should be performed on the suspicion that malignancy is present.

Lactic acid clinically means gastric stagnation in the presence of diminished free H.Cl. It is rarely demonstrated when free H.Cl. is higher than 10. It was demonstrated in rather more than 52 per cent. of the cases in our series. In nine out of ten instances where lactic acid was present in the gastric extracts, irremovable malignancy (stomach, perigastric lymph glands, adjacent viscera) was found at laparotomy. It is thus seen that the proof that lactic acid exists in test-meal specimens has an interesting prognostic value. It usually means that hopeless cancer is present. In about 48 per cent. of gastric cancers, however, lactic acid cannot be demonstrated in the test-meal. In this very group we have those instances of the disease most amenable to surgical treatment.

The Significance of the Demonstration of Specific Ferments in Gastric Cancer:

The formol index.—In the early diagnosis of neoplasms of the stomach, it would seem that the estimation of the ereptic power of gastric juice toward peptone solutions is of considerable value in supplementing the clinical history and other examinations. In a recent study, using the formaldehyde titration method suggested by Sorenson and Schiff, we were able to demonstrate rather characteristic findings in gastric cancer, particularly in *ulcus carcinomatosum*. The average formol index of 87 cases of proved gastric cancer was 22.3. The average index in 22 instances of *ulcus carcinomatosum* was 19.18; the average index in 99 cases of duodenal ulcer was 12.4; of 57 cases of benign gastric ulcer, 11.6; of 32 cases of benign achylia, 14.1; of 16 cases of pernicious anemia, 14.5, and of five cases of cancer of the liver, 4.25.

The edestin test (Fuld-Levison).—Our experience covers 108 cases. The work appears to indicate that early cases of gastric cancer, where the free hydrochloric acidity is low, are associated with high peptolysis and low proteolysis. In benign gastric ulcers low readings for both peptolysis and proteolysis are obtained.

The glycytryptophan test.—This reaction proved

positive in approximately 40 per cent. of 186 operatively demonstrated instances of gastric cancer. The reaction has but a chemically interesting value, apparently, inasmuch as, in our cases, where positive tests were obtained, diagnosis was generally quite possible from the clinical examinations.

The Wolff-Junghans test for soluble albumin.—From the examination of 230 instances of pathologically demonstrated gastric cancer (well established types of the disease and *ulcera carcinomatosa*) we obtained positive manifestations of the test in 80.1 per cent. There were 15 instances of *ulcera carcinomatosa* examined consecutively in which positive Wolff-Junghans' reaction was obtained in more than 90 per cent. Positive manifestations of the test were rarely obtained in cases of non-malignant achylia (extra-gastric malignancy, pernicious anemia, and the like). It would appear that this test, when taken as a part of evidence making for a complete clinical diagnosis, has suggestive pointings. The high percentage of positive reactions obtained in instances of *ulcera carcinomatosa* and early gastric malignancy of a fulminant type is not without clinical significance. It would appear to be an indication of laparotomy at a stage when the maximum benefit from localization of the disease would be obtained.

The Microscopic Examination of Gastric Contents.—There is no characteristic microscopic picture of early gastric cancer other than that associated with gastric stagnation consequent to the development of stenosing calloused peptic ulcer. In such event, the microscopic findings are those indicating simple gastric fermentation as a result of active proliferation of yeasts and sarcinae. When gastric cancer has become well established and with it varying grades of gastric retention are found, there is no microscopic picture more characteristic. Using the colored agar method which we suggested some four years ago, we were able to demonstrate organisms of the Boas-Oppler type in 94.1 per cent. of 172 consecutive instances of the disease. Yeasts were concomitant in nearly 31 per cent. Sarcinae were associated in rather more than 10 per cent. Threads of streptococci were found in nearly 7 per cent., and were especially common in excess in instances of non-stenosing malignancy. It is interesting to observe that when organisms of the Boas-Oppler type are present in gastric extracts, free hydrochloric acidity is below 10 in more than 90 per cent. of instances, and that an abdominal mass can be palpated in more than three out of four cases. The finding of an abundance of Boas-Oppler bacilli has a certain prognostic value, inasmuch as our study shows that in eight out of ten

instances where such organisms were present, palliative operations only were possible. The curable cases of gastric cancer are rarely associated with the demonstration of Boas-Oppler bacilli in gastric extracts. It is extremely uncommon to find bacilli of the Boas-Oppler type in instances of non-malignant gastric disease.

Epithelial cells showing atypical mitoses, so called "cancer-cells," were demonstrated in rather more than 1 per cent. of our cases. Occasionally a growth situated at or near the cardia permits of the prompt recognition of such abnormal cells, and an early cancerous process may be diagnosed thereby. As a rule, however, the findings of "cancer-cells" in the gastric extracts indicates an extensively sloughing process or one so located anatomically (cardia, high lesser curvature, fundus) that excision is impossible, even though the disease be not far advanced.

(b) *Serologic Analyses:*

Proper standardization of the Abderhalden technique may result in valuable information being obtained in early gastric cancer, particularly in instances where the malignant transition of a gastric ulcer is suspected. Unfortunately, when there exists the clinical suspicion that gastric cancer exists, it is not uncommon to find that the process has become well established and surgery can offer little.

IV.—FACTS RETURNED BY ROENTGEN EXAMINATION.

When gastric cancer has become well established roentgen examination gives useful information in more than 90 per cent. of instances. These cases show deformity in the stomach outline, alterations in gastric peristalsis and emptying power, variations in stomach size, abnormal position of the viscus or fixation to adjacent organs. In nearly 10 per cent. of our series of gastric cancer, the roentgen examination proved the diagnosis where previously but a suspicion that malignancy existed had been entertained. These cases were usually instances where the tumor was physically inaccessible, *e.g.*, at the cardia, fundus, posterior wall, or high on the lesser curvature. In the differentiation between gastric and extra-gastric malignant disease the fluoroscopic examination is of particular service.

The very early cases of gastric cancer or ulcer carcinomatosum rarely exhibit characteristic pictures by either x-ray plate or upon fluoroscopic examination. This is very fortunate because this is just the type of disease where the most can be done for the patient surgically. When the roentgen examination reveals definite evidences of gastric cancer other manifestations of the ailment are generally not lacking. In a recent series of 121 instances of

the disease in which roentgen findings were positive or strongly probable for malignancy in nearly 92 per cent. of instances organisms of the Boas-Oppler type were present in 93.8 per cent.; abdominal tumor or ridge was palpable in 73 per cent.; absent or very low free H.Cl. estimated in 88 per cent.; formol index above 18 in 91 per cent.; Wolff-Jung-hans' tests positive in 82 per cent.; gastric stagnation as shown by the physiological motor meal determined in 76 per cent., and clinical history that of primary malignancy or malignancy following dyspepsia of the ulcer type in nearly 96 per cent.

The surgical pathologist has taught us that chronic, calloused or crater ulcers of the stomach that are more than 1 cm. in diameter are microscopically malignant in nearly three out of four instances. They are actually or potentially cancer. The roentgen determination of a gastric ulcer of this type, particularly if such be located in the pyloric half of the stomach, should lead to a presumptive diagnosis of malignant ulcer and suggest abdominal exploration. It would appear that an observation of this kind would, in a large majority of instances, comprise the earliest possible roentgen diagnosis of gastric cancer.

V.—GASTROSCOPY.

In the hands of an expert, the Sussmann gastroscope permits of definite localization of gastric malignancy, but it is to be questioned whether such special procedure is of any great worth in the detection of early malignant changes, primarily in the stomach wall or arising in the edge of a calloused peptic ulcer.

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CANCER MORTALITY.

It is a fact that cancer kills about 75,000 people in the United States every year. Any disease which causes such a high annual toll should command the careful attention of the government, the medical profession, and the people. The need for this careful attention is all the more imperative if both the morbidity and mortality can be very largely reduced by cooperation on the part of these three forces, *i.e.*, the government, its people, and their physicians.

The reduction that has been caused in tuberculosis is now a matter of history. There can be no doubt that similar well-directed and persistent activity would cause a similar effect in cancer.—*Pennsylvania Med. Society Cancer Commission.*

THE EARLY DIAGNOSIS OF CANCER OF THE STOMACH.*

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Introduction: In the United States, during the year 1913, seventy-five thousand people died of cancer (Hoffman¹). Thirty-five per cent. of these cases, or about 26,000, were cancers of the stomach.

The mortality of this disease is no less appalling now than then. Mayo² says that "cancer of the stomach is the most frequent form of cancer in the human body."

The statistics collected by Rodman³ show that from 60 per cent. to 72 per cent. of gastric cancer developed upon an ulcer base. Any consideration of cancer of the stomach must necessarily include a careful study of ulcers of this organ.

With thousands of people dying yearly from this dread disease it is eminently proper that we should again and again revert to this topic in our medical meetings in order that not only the medical profession but also the people should give more attention to the beginning of gastric symptoms so that by early surgical intervention many may be saved from the ultimate cancer. Improvement in statistics can come only by treating the ulcer itself before or soon after it has begun to develop malignancy. In other words, a clinically recognized cancer of the stomach is practically beyond operative cure and it is only by the prophylactic, surgical treatment of the ulcer that the great mortality of cancer of the stomach can be diminished.

Thousands of people with well-defined symptoms of gastric or duodenal ulcers are inviting hemorrhage, perforation or cancer itself by continuing to dose themselves for their indigestion with all sorts of proprietary concoctions. Hundreds of doctors are treating ulcer patients for indigestion, neurasthenia, biliousness, etc., because they do not take the time and means to determine the real cause of the patients' illness.

Mayo says that the "mistakes in diagnosis are more often the result of a lack of examination than a lack of knowledge." I fully realize the difficulties in the way of making a correct diagnosis in many cases, even with the aid of the laboratory and x-ray plates, yet I contend that with or without laboratory confirmation of our suspicions the only safe

course to follow is to perform an exploratory operation and not wait until a hemorrhage, perforation or a palpable mass forces surgical intervention.

Inasmuch as cancer of the stomach is so closely related to ulcer of this viscus in its origin, symptoms and treatment, it is necessary for us to carefully study this antecedent pathologic condition as well as the graver lesion itself.

Etiology: Primary cancer of the stomach arising independently of a preceding ulceration must be very rare. Wilson and McCarty of the Mayo Clinic assign to ulcer a causative factor in 71 per cent. Moynihan ascribes over 72 per cent. of gastric cancers to this cause. Hartmann⁴, however, claims that ulcer acts as a cause in less than 10 per cent. of cases. Aschoff⁵ goes still further and says that the callous, gastric ulcers, which the microscope reveals as cancer, are explained by the assumption that the cancer is the primary lesion and that the ulcer merely develops in the malignant growth.

Notwithstanding these differences of opinion, I am convinced that the evidence furnished by American and English surgeons is too overwhelming to allow of any other conclusion than that at least 70 per cent. of gastric cancers arise from a preceding chronic ulcer.

The general belief that an embolus or a thrombosis in an artery is the usual cause of a gastric or duodenal ulcer will have to be modified. While such a cause may possibly act to produce an acute ulcer, Aschoff claims that certain mechanical factors, as the pushing in of the stomach wall by surrounding viscera or structures cause an elevation in the stomach and these elevated spots are subject to greater friction and traumatism than others and favor the erosion of the mucous membrane and its ulceration. On the other hand, Rosenow⁶ has caused ulcers of the stomach and duodenum experimentally by the intravenous injection of certain streptococci into rabbits, dogs, and a monkey. He claims that gastric and duodenal ulcers are not caused by swallowing bacteria, but by their entrance into the circulation often from infected tonsils and teeth. Such experimental lesions were found most frequently in the pyloric end of the stomach. He also found that inflammation of the gall-bladder with the formation of gall-stones and appendicitis were other results of bacterial injection. It is reasonable to conclude that, besides the usual causes which have heretofore been accepted as producing gastric and duodenal ulcers, traumatism and hematogenous infection are also important factors.

Location: Although there are variations in the

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statistics of different observers, it is reasonably certain that at least 75 per cent. of gastric ulcers and cancers are in the pyloric region of the stomach. Rodman says that 80 per cent. of gastric ulcers are in the pyloric one-fifth of the stomach and only 20 per cent. in the rest of the organ. To us this is very important because, unless these lesions are within the grasp of the grinding end of the stomach, no symptoms may arise to call attention to the condition until a hemorrhage, perforation in ulcer or a palpable mass in cancer suddenly appears.

Duodenal ulcers are three times more prevalent than gastric. But fortunately for the race, they are almost never followed by cancerous degeneration. Such ulcers are usually found in the first two inches of the bowel, more often on its antero-superior wall close to the pylorus.

In order to locate the pylorus, during a laparotomy, so that the position of an ulcer may be determined, Mayo has described the presence of a pyloric vein which we have often identified; but Hartmann claims that this landmark is unreliable. He also quotes Latarjet, Houdard and Mocquot and concludes "that nothing in the aspect of the veins of this region can enable one to recognize the seat of the pylorus."

Age and Sex: There are three times as many males as females afflicted with these lesions. The age incident is about the same in both sexes. Ulcers appear in the earlier years, cancers in the later. Most cases will be found between the ages of 20 and 50, with ulcers predominating in the first half and cancers growing more numerous in the last half of the period.

Symptoms: Inasmuch as the usual gastric cancer develops upon an ulcer base and has no independent pathognomonic symptoms in its early stage our only chance of lessening the heavy mortality of cancer of the stomach lies in an early diagnosis and treatment of the primary lesion.

If the case is one of primary cancer of the stomach, arising independently of ulcer, the probability of its early detection is very slight unless the growth lies within the pyloric sphere and excites pyloric spasm.

While spasm of the pylorus is a constant attendant of both gastric and duodenal ulcers and growths, benign as well as malignant, in the smaller end of the stomach, it is also excited by other and even distant lesions, as gall-stones, chronic appendicitis, etc., and one needs to keep in mind such possibilities.

Many writers and most text-books give us clear-cut symptoms differentiating ulcers in the stomach and in the duodenum, and also the symptoms to be

found in cancer of the stomach, but we must remember that there are many variations and each case must be studied by itself.

Mayo⁷ says that cancer of the stomach *does not produce* symptoms of cancer during the *curable* period. And in reference to the clinical diagnosis between gastric and duodenal ulcers, Hartmann says that "the symptoms given as characteristic of duodenal ulcer by German and American authors are in our opinion simply signs of pyloric spasm." Again, "pyloric spasm whether due to gastric or duodenal ulcer give late pain—three to four hours—after eating, often at night, with painful sensation of hunger relieved by food." Further, he says that in 200 cases of perforating duodenal ulcer, seventeen gave no previous sign of such a condition. In fifty-five the symptoms were very vague and none characteristic of duodenal ulcer.

I have been called to operate upon perforating ulcer when either no history of a previous ulcer state could be obtained, or such history only upon careful inquiry after the operation. In only a few cases is there any history of a preceding stage of gastric disturbance. In the chronic ulcer, however, there is usually a long and fairly typical combination of symptoms.

The symptoms of ulcer, whether gastric or duodenal, are practically the same, but vary as to onset, duration and cessation.

Pain is probably the most significant symptom. Some sort of pain is present in probably over 90 per cent. of cases, but it is atypical in at least half of these. Usually it is felt in the pit of the stomach and radiates up behind the sternum, back to the left of the spine or to the base of the chest on one or both sides. Pain is not caused by food, with one exception and that is ulcer of the lesser curvature of the stomach, but by the irritating acid gastric juice coming in contact with a raw surface.

In gastric ulcer, pain will then appear during the height of digestion in that organ, usually from one to three or even more hours after eating. It increases in intensity as the gastric juice becomes more acid, is attended with nausea, eructations of gas and sour fluid until relief is obtained by neutralizing the acid juice by more food, by alkalies or by ejecting the stomach contents by vomiting.

In duodenal ulcer, pain is usually felt from three to four hours after eating, when the acid chyme is being injected into the duodenum and comes into contact with the ulcerated area. This pain lasts while the stomach is emptying itself of its acid contents, about two hours. The pain is relieved by the same measures that give relief to the pain in the first instance. During the night, the patient is often

awakened by so-called "hunger pain" in duodenal ulcer. This is caused by the acid secretions forming in the empty stomach and irritating the ulcer. Relief is obtained by taking food or alkalies. It is supposed that "hunger pain" felt at night is particularly a symptom of duodenal ulcer, but Hartmann claims it is present in both gastric and duodenal ulcer and is merely a symptom of pyloric spasm.

Nausea, persisting until vomiting takes place, is a more constant symptom of gastric than of duodenal ulcer.

Hematemesis is, of course, a more constant attendant of gastric and *melen*a of duodenal ulcer, but both may be present with either.

Persistent *occult blood* from the stomach or in the feces is a very sure sign of ulcer. It is really more valuable than gross bleeding which may come as a result of cardiac insufficiency or cirrhosis of the liver.

These symptoms of pain after eating, distress, gas, acid eructations and regurgitations after meals, relieved by taking food or alkalies are the few upon which one constructs a tentative diagnosis. They are all essentially chronic, lasting for many years. They are also periodic, coming on apparently suddenly, lasting for weeks or longer and as suddenly leaving. During the interval the individual is apparently well. As time goes on, these attacks grow more frequent and last longer, so that the well interval gradually diminishes and there is digestive suffering most of the time. When the later stages of the disease are reached there will be a considerable loss in weight, more so in gastric than in duodenal ulcer, and with a cachexia added to the anemia if the case is one of cancer.

The late symptoms of failing gastric motility, food retention, gastric dilatation, etc., while indicating a much more serious state of the patient are so evidently a part of severe pyloric obstruction that no one would slight them. They therefore do not interest us here.

Physical Examination: This is practically negative in the early case. About all one can find is a tender spot at the tip of the ensiform appendix or close by. If a palpable tumor is present, with long-standing symptoms of gastric type, the inference is justified that the case is one of cancer and probably inoperable. I do not mean by this that no operation should be done, but that when the operation is performed it usually is only palliative and not radical. There are exceptions, however, as the cases cited by Lerche⁸ show: seven cases having epigastric pain, vomiting and tumor; two cases with pain and vomiting without the palpable tumor; two

with pain and tumor without the vomiting. Diagnoses of carcinoma were made in seven instances, fibrous stenosis in two cases, and pyloric spasm with ulcer in one case. There was found at the operations a spastic tumor of the pylorus that disappeared under the anesthetic in five cases; the same with ulcer in one; slight hypertrophy of the pylorus in one; a cicatrix near the pylorus in two; the pylorus adherent to the pancreas in one; varicose veins about the pylorus in one; and a tiny myoma near the pylorus in one.

Diagnosis: At times the diagnosis of gastric or duodenal ulcer is easy because there is such a well-marked train of typical symptoms with proper spacing of the separate symptoms. Usually there is a question in each diagnosis, because we know how difficult it is to differentiate the one site of ulceration from the other, or to recognize an ulcer itself from many other conditions.

When it comes to the diagnosis of cancer, we are much at a loss. The early cancer has no symptoms *per se*. This I would emphasize. To expect to be able to diagnose early cancer is futile. Knowing, as I have already stated, that it is the frequent sequel of ulcer, when an ulcer is diagnosed the inference is justified that it may also be beginning malignant degeneration. Such degeneration can be detected only by careful microscopic examination, after the lesion has been excised. The differential diagnosis is helped by just two laboratory measures: analyses of the gastric contents and feces, and careful x-ray photographs and fluoroscopic examinations.

As a rule, the ordinary gastric examinations, test meals, etc., have given very little help in the solution of the problem. This is so true that we find Mayo saying that "the laboratory tests are relegated to minor positions," and that "the value of purely laboratory examinations of gastric contents (in ulcer) was found to have been over-estimated."

While the ordinary method of making the gastric examinations is unreliable, there is a method, originally proposed by Gluzinski, that promises better results.

Nicolaysen⁹, in writing upon Gluzinski's test in the diagnosis of gastric ulcer, seems to show that this method has real value. It is based upon the facts that ulcer in the pyloric portion of the stomach, with retention, causes hyperacidity; that cancer is attended with a mucous catarrh which causes the disappearance of free H.Cl.; that during the transition from ulcer to cancer there will be found free H.Cl. up to a certain stage of the disease; but during the progress of the mucous catarrh there

will occur secretory insufficiency which will be demonstrated by giving two test meals, one immediately following the other.

The examination proceeds as follows:

1. The gastric contents from the fasting stomach.
2. A test breakfast of the white of a boiled egg and 200 cc. of water, recovered in three-fourths of an hour.
3. A test dinner of beefsteak and 250 cc. of water removed 3¾ hours later.

The stomach is washed out before and after the first test meal. The second meal is given immediately after the second washing.

The results:

Ulcers—Both breakfast and dinner give distinctly free H. Cl. reactions.

Beginning cancer—The first meal gives distinctly free H.Cl. The reaction of the second shows only a slight trace of or no free H.Cl.

Kocher has improved upon this method by determining that the percentage of free H.Cl. in the two meals is present in larger quantities after the second meal in ulcer, while in cancer this meal shows the lowest percentage of free H.Cl. The value of this method depends upon the increase or decrease in the amount of free H.Cl. in the recovered meals.

In thirty cases of ulcer, operation verified the diagnosis in twenty-seven; uncertain in two; one showed carcinomatous degeneration of an ulcer, though the test indicated simple ulcer. This test must be taken in connection with the other symptoms and with the history of the case.

I have found that free H.Cl. may decrease in the second meal in diseased conditions of the gastrointestinal canal other than cancer of the stomach, *e.g.*, in gastro-enteroptosis with obstruction.

The test is merely one of function showing failing ability of the gastric mucous membrane to secrete H.Cl. This failing ability may be found in other conditions than in cancer. Further experience is needed to show what are these conditions.

In twenty-five cases of ulcer, all but one reacted in a manner described by Gluzinski and Kocher, *viz.*, with a decided increase in the percentage of H.Cl. and of total acidity. This fact may be used in diagnosing lesions not ulcers, accompanied by dyspepsia. For instance, in two cases diagnosed as ulcer there was hypo-acidity, with very little increase after the test dinner. No ulcer was found at the operation, but adhesions between the duodenum and gall-bladder. Both were cured by the operation.

There was found an increase in acidity in duodenal ulcers after the second meal. It was moderate and not marked enough to be made a means of dif-

ferential diagnosis between stomach and duodenal ulcers. No definite results were obtained in indigestion due to appendicitis.

Hartmann says that Meunier has recently pointed out a process that will permit of the localization of an ulcer. Empty and wash the stomach, then make a second washing with 200 grammes of a 1 per cent. solution of glacial acetic acid. When this solution comes in contact with the pylorus, the pylorus closes and the duodenum cannot be bathed with the fluid. The acetic acid solution dissolves the crystals of hematin which exist upon the surface of the ulcer however small it may be. In this fluid obtained by the second washing blood is tested for by the usual chemical processes. If there is a gastric ulcer, the reaction is positive; if the ulcer is in the duodenum, the reaction will be negative.

The roentgen photographs are the evidence upon which greatest reliance is placed. The conclusions of an expert radiologist after study of the necessary plates are about the last word in deciding upon the location of the lesion and its nature. There are mistakes made, however, and we must not pin our faith too strongly upon the x-ray diagnosis.

Carman¹⁰, speaking on the value of the x-ray in gastric and duodenal ulcers, states that of 198 cases operated upon for duodenal ulcer, 135 had been diagnosed by the x-ray. Yet to show the limitations of this laboratory method he says of sixty-eight cases diagnosed as ulcer of the duodenum, twenty-nine had gall-bladder affections, seventeen had chronic appendicitis, and twenty-two had miscellaneous conditions.

The reports of Cole, Caldwell, LeWald, Quimby, Stewart, and others of our own roentgenographers in New York City give us much greater help than Carman's figures show.

We have already stated that cancer is very rare in the duodenum. Early cancer in the body of the stomach causes so few and unimportant symptoms that its diagnosis in an early stage is purely a matter of operative chance.

Because the great majority of gastric cancers are located in the pyloric portion of the stomach and usually have an ulcer for their starting point, the chances of diagnosing an early cancer in this region are much better than elsewhere. Any chronic lesion in the pyloric end of the stomach causing pyloric spasm, whether diagnosed as ulcer or as cancer, demands immediate operation. If the condition should prove to be ulcer, a possible cancer is prevented from developing. If a cancer has already begun, it may still be possible to cure the patient by the early operation.

Any x-ray findings that show deformity, classed

as ulcer, cancer, adhesions, gall-stones and similar intra- and peri-gastric lesions, justify operation at the earliest convenient time, certain contra-indications being taken for granted.

Jeddlicka (Rodman³) states that all ulcer carcinomas were encountered in the pylorus. Ulcers in other parts of the stomach did not reveal a single carcinoma.

The Living Pathology: Hartmann gives a very good summary of the appearance of ulcer and cancer as follows: "In chronic gastric ulcer the peritoneal surface is edematous, it has lost its polish, is thickened and much congested with reddish spots disseminated through the area. In a cancer plaque the serosa is altered. It has a whitish color, is nowhere congested, often shows fine white lines or a network of yellowish points. The lymph glands, in ulcer, if enlarged, are soft and movable. In cancer they are small and very hard. To the naked eye the diagnosis between a callous ulcer and cancer of the stomach wall will always be difficult." He says he attaches no importance to examinations from frozen sections. That this technic is really a snare, for the hasty examination of a few sections can give no certainty. Reliance must then be placed upon macroscopic examination and previous clinical study.

Hertzler¹¹ says that the diagnosis of gastric carcinoma at exploratory operation depends upon the discovery of a tumor, and the principal lesion to be excluded is indurated ulcer. Differentiation between them is not always possible, but the diagnosis is usually easily made if carcinoma is really present. Usually inflammatory masses are elastic, though dense, and the outlines are everywhere smooth. When doubt exists the mass is probably inflammatory, particularly if the mass is in the region of the pylorus. When it is situated in the lesser curvature the opposite probability obtains, and a doubtful lesion in this situation is probably carcinomatous, particularly if there are no adhesions, if nodulations are present at the periphery and small white points can be made out in the peritoneum.

Treatment: The physician holds that many ulcers of the stomach and duodenum are curable by medical measures. The surgeon maintains that such cures are only apparent, that return of the ulcer is the rule, and that the longer an ulcer lasts the greater risk there is of perforation, suppuration, hemorrhage and malignant change. Mayo expresses the opinion that "the permanent healing of chronic ulcers of the stomach or duodenum by non-operative means must be of rather infrequent occurrence," that "ulcers may appear to have healed, but the interval operation shows that they have

not," that "a patient with ulcer treated medically is in far greater danger of death from hemorrhage, perforation, obstruction or cancerous degeneration than he is from operation."

I believe that the time is not far distant when the same course in ulcer of the stomach or duodenum will be followed that is observed at present in regard to appendicitis, viz., that as soon as the diagnosis is made the case becomes a surgical one and demands operation.

Cancer: If the diagnosis points unmistakably to cancer, immediate operation is imperative. The same statement is accepted by both medical and surgical practitioners if there is a *probability* that cancer exists. The type of operation cannot be determined before the abdomen is opened and a careful examination made.

If the case is so far advanced that a radical procedure is impossible, one of the palliative measures may be used. When possible the no-loop posterior gastro-enterostomy should be selected. If posterior adhesions and cancer extension forbid this, the anterior anastomosis should be done.

I have had a patient live over two years with such extensive cancerous involvement at the time of the operation that only a small part of the greater curvature of the stomach was sufficiently free of the growth to allow of a long anterior loop operation. Others have lived for a shorter time, but, with comparative comfort. And again, I have had a death follow from persistent vomiting where only the anterior loop method was possible. By these palliative operations, in the advanced cases, life may be prolonged and the patient's comfort much enhanced.

In the frankly cancerous state, but with only a moderate involvement of the lymphatics, a more radical operation is possible. A pylorectomy or gastrectomy with excision of the glands and a posterior gastroenterostomy is here indicated, or the direct anastomosis of the cut end of the stomach to the jejunum as suggested by Pölya and endorsed by Mayo¹². The end of the stomach is applied to the jejunum from 6 to 12 inches from its origin. Pölya reported six cases with three deaths; Mayo performed twelve such operations with one death.

For Pölya's operation to be successfully used, the stomach must not be dilated; it should be freely movable and the growth must be confined to the pyloric region.

In reference to whether a case is operable or inoperable, the condition of the lymphatic glands is a strong deciding factor. Yet mere enlargement of the glands does not preclude a radical operation, inasmuch as such enlargement may be inflammatory,

at least in the more distant nodes, and if all such glands are removed the chances of even a permanent cure are not entirely visionary.

If it is possible, then, to perform a radical operation, even in the presence of enlarged glands, this should be done and the glands removed as well. Furthermore, adhesion to the pancreas that requires excision of part of that gland itself has been followed by apparently permanent result, but the mortality is very high.

Each case must, then, be treated upon its own merits. Cases that were once inoperable to us become subjects for radical treatment as our experience and technical skill become greater. To leave a removable cancer is to assure a fatal termination. A fatal termination may result even if a radical operation is performed, but some apparently hopeless cases subjected to radical operations will astonish us by recovering and living for several years afterward.

Brilliant results in the surgical treatment of cancer of the stomach will not be won in the frankly cancer cases. Improvement will come here as in appendicitis, by operating early upon those cases usually diagnosed as ulcer. The consensus of opinion is that the great cause of gastric cancer is the ulcer.

From my limited knowledge, I believe that if the medical treatment of gastric ulcers year after year was admitted to be a failure, as it is, and operation insisted upon by our medical confrères, we would see a great falling off in the number of gastric cancers, especially the so common inoperable ones.

Ulcer: Given a gastric ulcer, what is its proper surgical treatment? Shall we do a pyloroplasty after Finney¹³, a pylorectomy and gastro-enterostomy after Rodman, a simple anastomosis of the stomach and jejunum as advocated by Peterson in 1901, or a burning out of the ulcer with a cautery as advised by Balfour? Shall we excise or merely infold the ulcer and shall a gastro-enterostomy be added, and, if the latter is done, must a pyloric exclusion be also carried out?

Is it possible to reduce the entire problem to a series of simple statements founded on fact and experience and not be affected by the fads and fancies of anyone in particular? I think that we can accept certain propositions as proven beyond question that there are certain operative measures that all acknowledge to be rational, that these we can follow because they are simple, effective and based on years of experience. I have attempted to make such a summary in the following statements:

1. Hyperacidity is an early symptom of ulcer, gastric or duodenal. The patient's distress arises

from this cause and ceases with the neutralization of the acid.

2. Pyloric obstruction follows in ulcer from a reflex spasm of the pylorus. In cancer it is due to a mechanical hindrance to the food current as well as a reflex spasm.

3. Pyloric obstruction, spasmodic or mechanical, is circumvented by a gastro-tenterostomy, short-circuiting the food current into the jejunum. The symptoms due to such obstruction are thereby relieved.

4. While most writers claim that this anastomosis cures by "drainage of the stomach" of its acid secretions and removal of the obstruction to the food current, Paterson¹⁴ says that gastro-enterostomy does not act by drainage, but by diminishing the total acidity, due partially to a diminished secretion of chlorides and partly to neutralization of the acid by the alkaline bile and pancreatic juices which regurgitate into the stomach through the anastomotic opening. Kocher says that bile regurgitates into the stomach in nearly every case of gastro-enterostomy, but does no harm.

5. A simple gastro-enterostomy is usually curative in uncomplicated gastric or duodenal ulcers. It should be placed as close to the pylorus as possible. Paterson remarks that "the posterior operation (gastro-enterostomy) is good anatomically, but physiologically unsound; the anterior operation is good physiologically, but anatomically bad," and again that "the immediate results of the posterior operation are better than the anterior, but as to the remote results the advantage lies with the anterior operation."

6. Old, chronic, indurated ulcers should be excised, burned out, or if at the pylorus an excision of the pylorus performed. This advice is based on the fact of the frequency with which these ulcers undergo cancerous degeneration. The procedure is, of course, in addition to the usual anastomosing operation. I believe this is sound teaching, although Paterson, Kocher, Gressot claim that malignancy follows in less than 3 per cent. of all cases after gastro-enterostomy for simple ulcer. Paterson also says that excision of simple ulcers is not based on established conclusions and is contrary to clinical experience. Von Eiselberg¹⁵ says that the results of gastro-enterostomy are not so good with an ulcer at a distance from the pylorus as when immediately at the pylorus. Sherren claims that in chronic gastric ulcers, infolding and posterior gastro-enterostomy give results unequaled by any other operation, that this is the operation of choice, and that excision or gastrectomy are necessary only for the complications.

However, I think we will unanimously endorse Mayo's advice, that all ulcers of the stomach should be excised if possible on account of the menace of cancer. Aschoff's contention that callous gastric ulcers, which are revealed by the microscope as cancers, are really primary cancers with beginning ulceration only emphasizes the necessity of radical operation on all such lesions.

7. Just now the surgical journals are filled with arguments for and against pyloric exclusion in connection with a gastro-enterostomy. It is plain that all old, indurated, callous ulcers wherever situated should be excised and the anastomosis performed. It is also plain that if this lesion is situated at the pylorus, the best way to perform such excision is by a pylorotomy. But that after excising or burning out an ulcer in the lesser curvature or body of the stomach and making the anastomosis a further step is necessary in the shape of excluding the pylorus, I do not believe. The argument of those who contend for pyloric exclusion is based on a proven fallacy, viz., that unless the pylorus be closed the anastomotic mouth will close, that the only exit for food will again be through the pylorus, and that a return of the ulcer state will follow. Kocher does not close the pylorus. He claims that occlusion of the pylorus prevents integral restitution of the ulcer. Hartmann¹⁶ disagrees with the commonly accepted opinion that with a patent pylorus a gastro-enterostomy will spontaneously close. He says that "the cases of anatomical obliteration of the gastro-enterostomy anastomosis were in no way connected with the permeability of the pylorus" and that "sometimes obliteration results from cicatrization of a peptic ulcer developed in the anastomotic opening. The technic has a direct bearing on the question; as obliteration is exceptional in cases not operated by the button or Y-method." He substantiates his beliefs by the report of x-ray examinations and animal experimentations. Nineteen of his cases showed that the stomach contents were evacuated through both pylorus and anastomotic mouth. In one case everything went through the pylorus. In eleven cases everything went through the anastomosis. In seven cases the course was through the pylorus and anastomosis.

Soresi¹⁷ states that in a case of secondary ulceration of the gastro-enterostomy opening the orifice was plainly visible and had not contracted. This was 148 days after the first operation for ulcer of the duodenum without closure of the pylorus. He thinks that the material used in forming the anastomosis is very important, that catgut should be used for the inner, through and through suture, and silk or linen for the outside, peritoneal suture. He

came to this conclusion after experimental work when he found that frequently the inner suture remained attached to some part of the anastomotic opening, preventing healing and favoring an ulcerative process. I think his suggestions very practical, provided the inner suture is not absorbed too soon and hemorrhage thus invited.

It is unreasonable to believe that an opening lined with mucous membrane will close merely because the pylorus is also patent. That such an anastomotic opening should spontaneously close is further improbable, judging the behavior of those cases where closure of the pylorus has been attempted. It is almost impossible to make the pylorus stay occluded unless a typical pylorotomy is done. Not only is occlusion of the pylorus uncertain by any other method, but it is not necessary in any case, besides adding to the time and traumatism of the operation.

Ulcers at the pylorus which require excision, *per se*, are beside the argument. These remarks apply to those ulcers which are at a distance from the pylorus, as in the lesser curvature.

In conclusion, then, *recent* gastric or duodenal ulcers, wherever situated, demand a simple posterior, no-loop gastro-enterostomy. Old, chronic, callous, indurated ulcers, whether in the stomach or in the duodenum, require excision or burning out with the cautery, in addition to the anastomosis. If this ulcer is located at the pylorus, a pylorotomy guarantees the most radical excision and should be performed in connection with the gastro-enterostomy. Duodenal ulcers are treated on the same lines, a gastro-enterostomy being performed with or without excision of the ulcer depending upon the condition of the ulcer itself. In many instances a Finney operation will satisfy every demand, besides allowing inspection of the affected area.

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THE EARLY DIAGNOSIS OF CARCINOMA OF THE BILE AND PANCREATIC DUCTS.

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The early recognition of malignant growths, anywhere in the body, is a problem that is absorbing every attention and effort of the united medical profession. Until such a Utopian era shall arrive in which neoplasms will dissolve under the powerful action of anti-cancer sera, selective chemotherapy, or some other agency, the hopes of mankind must rest in the skill and judgment of the surgeon. But only when the diagnosis of the condition is made in the earliest stages, when the threatening agent is still in the incipient period of growth, can we expect the surgeon successfully to remove the evil.

These commonplace statements apply nowhere more forcibly than in the field of new growths included under the title of this paper. It is only recently that surgeons have attempted the eradication of neoplasms of the bile ducts and pancreas; the difficulty of approach has made carcinomata of this area a *noli me tangere* to all except the most courageous operators. The last few years have shown an increasing number of reports from competent and reliable surgeons who have successfully removed neoplasms in this region. The reason why this difficult operation is not more often undertaken is, aside from the technical handicaps, because the recognition of the nature of the disease is not accomplished sufficiently early to allow the surgeon a reasonable expectation of complete excision of the malignant process.

It is no unusual occurrence to meet patients in middle age who have been jaundiced for weeks or months, suffering from attacks of cramp-like pain, losing in weight, and with acholic stools. Such cases very often defy the diagnostic acumen of the most competent clinicians, for the differential diagnosis between neoplasm, gall-stones, pancreatitis, etc., is most difficult, sometimes impossible. The usual course is to "observe" the case for a longer or a shorter period waiting for a possible stone to pass, or for the effects of medication hopefully admin-

istered, or to note variations in the depth of the icterus. This period of waiting is the golden opportunity of the surgeon, for now, if the case be new growth, it is still small and localized. The weeks of indcision and watching pass rapidly, and with them the opportunity for beneficial intervention.

Fortunately and happily, we have in the duodenal tube a new means for the early recognition of neoplasms involving the lower bile ducts and head of the pancreas. This tube, by entering the duodenum, allows of the collection of the secretion of the upper segment of the small intestine, and affords definite data of the presence or absence of the bile and the pancreatic ferments as well as of qualitative variations of the amount of each present. The data so obtained are of powerful assistance in coming to a conclusion on the cause of the illness, giving in most instances a definite diagnosis.

In order the more easily to comprehend the basis upon which such a means of diagnosis can be utilized, a few remarks on the pathology of these tumors are decidedly in place. Under the group heading of neoplasms of the bile and pancreatic ducts we need discuss only carcinoma and sarcoma, as benign new growths are so rare as to be practically negligible; in fact, the rarity of sarcoma leaves carcinoma as the main representative of this class of tumors. Cancers in this region originate from:

- (1) *Common bile duct—relatively common.*
- (2) *Ampulla of Vater—rare.*
- (3) *Duct of Wirsung—rare.*
- (4) *Papilla of Vater and Duodenal mucosa about the papilla of Vater—relatively common.*
- (5) *Head of pancreas—less common.*
- (6) *Carcinoma of the stomach, gall-bladder, colon, etc., which involve the biliary apparatus by contiguity or metastases—relatively common.*

The first four varieties of tumors have the following common characteristics. They are usually relatively small tumors, varying in size from a pea to a walnut, or rarely as large as a small lemon. They are adeno-carcinomata, usually of the cylindrical-cell variety, growing slowly, producing late metastases in the regional and neighboring lymph nodes, practically never in distal organs except, occasionally and late in the course of the disease, in the liver.

Early in the history of their growth they constrict the lumen of the bile and pancreatic ducts and completely obstruct it. Later in the progress of the disease secondary ulceration may occur to release again the contents of these dilated ducts, but

all these growths at some period of their existence completely obstruct one or both of the duct systems.

It is upon this point that the use of the duodenal tube rests, for by its means the complete closure of one or both ducts is ascertained. By the chemical absence of bile or pancreatic ferments in the duodenal contents, the condition is established as one of neoplasm.

It should hardly be necessary at this late day to describe the duodenal tube and its method of employment. The rapidly growing literature on the subject of duodenal intubation has made its use familiar to most readers.*

I have examined the duodenal contents of fifty-six cases in which jaundice was present, apparently because of a disease of the biliary tract or pancreas. The results can be summarized as follows:

Cholelithiasis and cholecystitis, twelve cases—bile, abundant; pancreatic ferments—normally present.

Catarrhal jaundice, one case—no obstruction to either duct system.

Impacted stone in common duct, six cases—in five of them partial obstruction to bile; pancreatic ferments normally present. In only one case complete obstruction to bile.

Neoplasms, seventeen cases—in sixteen of these cases, or 94 per cent., the bile was completely absent from the duodenum on one or more occasions on which the duodenal tube was passed. In the one case in which bile was not found completely absent, an ulcerating tumor of the head of the pancreas was discovered at autopsy. The necrosis and ulceration of the tumor had served to release the obstruction, freeing the retained contents of the ducts.

The findings in regard to the pancreatic ferments depends on the site of the tumor obstruction. If the tumor is located anywhere between the junction of the hepatic ducts and the head of the pancreas, the pancreatic ferments are always found in the duodenum, usually in normal strength, although occasionally the activity of the enzymes is dimin-

ished by the proximity of a cancerous growth. Where the tumor occupies the head of the gland and its immediate vicinity, it extends early in its course so as to completely obstruct both bile and pancreatic duct systems. In these cases complete absence of bile and pancreatic enzymes is most easily demonstrated, and is absolutely pathognomonic.

Pancreatitis, six cases have been observed. Here bile is usually only partially obstructed; the marked diminution of pancreatic enzymes is characteristic, even long before the changes take place in the stool, namely, visible increase in bulk, and excess of neutral fat and muscle fiber microscopically demonstrable.

Hypertrophic cirrhosis of the liver, seven cases. Both bile and pancreatic enzymes are increased rather than diminished in volume and strength.

Upon reviewing these duodenal findings in the several classes of cases as above recounted, one fact stands out prominently: *The complete absence of bile in the duodenal contents is characteristic of tumors involving the bile duct and pancreatic systems. This occurs in over 94 per cent. of the cases. The additional complete absence of pancreatic ferments makes the diagnosis of neoplasm absolutely certain, besides localizing the tumor at or about the head of the pancreas.* This condition is in contrast with that found in all other conditions with which neoplasm must be differentiated. Cholelithiasis, catarrhal jaundice, impacted common duct stones, pancreatitis, cirrhosis of the liver, rarely, if ever, completely block the passage of bile into the intestine. Marked diminution of pancreatic ferments speaks strongly for pancreatitis, though this occasionally happens in the presence of neoplasm in the proximity. *Complete absence of pancreatic ferments, with absence of bile, spells tumor, and only tumor.*

The complete absence of bile in new growth is probably the true explanation of Courvoisier's law, a law which states that with inflammatory and calculous obstructions of the bile duct, the gall-bladder is usually not palpable, while in neoplastic obstruction the gall-bladder is easily palpable as a large globular mass in the hypochondrium. As long as some leakage through the common bile duct is allowed, the gall-bladder does not fully distend, but when the obstruction is complete as with tumor, the distention of the gall-bladder reservoir is maximum.

It has been stated above that 94 per cent. of cases of neoplasm situated on the biliary and pancreatic systems cause complete obstruction of one or both ducts. What class of case is represented by

*For full details of the employment of the duodenal tube as well as for the collection of the chyme and its chemical examination in my hands, I refer the reader to my earlier publication in the *American Journal of Medical Sciences*, 1913, CXIV, 393. In this paper technic and methods are fully considered. Suffice it to say that a thin rubber catheter, one meter long, having at one end a weighted metal perforated capsule (I have always employed the Einhorn duodenal pump), is swallowed for a distance of 80 cm. This is done at night, and the next morning, two hours after a test meal of milk is drunk, the tube, the metal end of which is now resting in the duodenum, is aspirated and the duodenal contents removed. Simple chemical methods give the information as to the presence or absence of bile and pancreatic ferments, and the quantitative strength of the latter.

the remaining 6 per cent.? This question leads us to the smaller group of tumors, in which secondary ulceration has advanced to such a degree that the body of the tumor is necrotic and absent, and the dammed back secretions in the ducts seep through the fungous new growth mass. In these cases the diagnosis by means of duodenal content analyses is faulty, and an error is avoidable only when the total evidence is considered and weighed. These cases of ulcerating tumors with only slight obstruction present a distinct clinical picture which clearly differentiates them. They are usually advanced cases, in which jaundice has been present for weeks or months: frequently the history states clearly that the icterus had been very marked, and then suddenly had almost completely disappeared; occasionally one sees such a case for the first time when the jaundice has reappeared, and the physician is at a loss to explain the recurrence of the symptoms. The preliminary stage of icterus is usually regarded as a catarrhal jaundice and the clearing up of the symptoms is naturally expected and anticipated.

But there are features of these ulcerating new growths which are quite characteristic. They spring usually from the duodenal surface of the papilla of Vater. In the course of their ulceration, ascending infection of the biliary passages takes place. Secondary hemorrhage from erosion of vessels is almost the rule, either microscopic bleeding or large and dangerous hemorrhages. Emaciation is rapid. A marked leucocytosis is constantly present. The duodenal contents of such a case, taken in the later period, shows only partial diminution of bile, and normally present ferments. But the clinical picture is easily identified and the diagnosis must be made in spite of the duodenal findings. Jaundice, remitting temperature of the so-called "septic" type, leucocytosis, and blood in the intestinal contents definitely characterize ulcerating tumor of the papilla of Vater. Fortunately, this type of case is not common, and in the great majority of instances the complete absence of bile and ferments is ascertained at the first or surely the second examination.

Another point in the early diagnosis of biliary and pancreatic new growths by means of the duodenal tube is the differentiation from chronic pancreatitis. Of course, where the inflammatory process in the gland has extended so far as to cause gross changes in the character of the stools, namely, pale and bulky defecations with large excess of neutral fat and muscle fibers, the differentiation is simple. It has been my experience with tumors of the pancreas proper that, though they may completely obstruct and prevent all passages of enzymes into the intestine, yet none of the characteristic

changes of pancreatic disease occur in the stool; except very late in the disease when complete infiltration and destruction of the parenchyma of most of the gland may also cause the typical alvine evacuations. In order to differentiate early pancreatitis from beginning carcinoma the examination of duodenal contents is dependable, offering in fact the only reliable means at hand. In chronic pancreatitis, bile is usually present, though rarely it maybe diminished or absent when a sclerosing process of intra-acinar nature is mainly localized at the head of the gland. The enzymes of the gland, however, are always present but in *distinctly diminished quantity*, giving weak reactions to the usual chemical tests. On the other hand, in tumor, bile is practically always absent; the pancreatic ferments are either normal (when the neoplasm is situated above the junction of the bile duct with the duct of Wirsung), or completely absent (if the tumor occupies the head of the gland and the ampulla or papilla of Vater). All other clinical means of differentiation fail in the early cases before the typical stool changes if an inflammatory process occur. An enlarged palpable gall-bladder may occur in either; pain, even of a violent character, may be noted in either disease; fever, emaciation, jaundice are symptoms that may be common to both conditions.

Let us then review the proper steps in approaching the differential diagnosis in the case of an adult suffering from a condition of obstructive icterus, with abdominal pain, emaciation and pale stools, the whole duration of the symptoms being a few days or a few weeks. To begin with, a careful perusal of the history may disclose some interesting facts. A history of longer duration with an uninterrupted course reminds one of a chronic disease, for example, chronic pancreatitis or hypertrophic cirrhosis of the liver; also of cancer. A history of an interrupted or remissive jaundice may point to cholelithiasis or, also, ulcerating neoplasm of the papilla of Vater; such remission rarely occurs in pancreatitis. In the physical examination there are also some important data to be obtained. The palpation of a large hypertrophic liver is quite characteristic; particularly when accompanied by a palpable and enlarged spleen. The slight increase of the size of the liver met with in cholelithiasis or carcinoma of the bile ducts is less noteworthy. Metastatic carcinomatous nodules (occurring as small growths secondary to neoplasms originating in the bile ducts or about the head of the pancreas) are practically never palpable in the free edge of this organ.

A globular, enlarged gall-bladder may signify either new growth or sclerosing pancreatitis; the absence of a palpably engorged gall-bladder does not rule out neoplasm, as the tumor may be of the ulcerating type without complete obstruction of the biliary system.

Fever of an irregular, remitting variety, and an increase in the leucocytes in the circulating blood, occur in both common duct stones (with secondary cholangitis), and in ulcerating neoplasms involving the duodenal mucosa (with secondary cholangitis). With calculi, chills are more likely to occur; in ulcerating tumors, bloods, either gross or chemical, is almost invariably found in the feces.

The stool examination may now be conclusive, for the characteristic bulky pale stool with excess of free neutral fat and muscle fibers is unmistakable as a sign of pancreatitis. (An artificial diarrhea caused by saline cathartics may give neutral fat and excess of muscle fibers in the feces in a case of obstructive jaundice not of pancreatic origin; one must be guarded against making such an error.) Blood in the feces is strong presumptive evidence of tumor, as also is complete failure to demonstrate bilirubin in the intestinal evacuations.

The examination of the gastric contents throws little or no light on the diagnosis. Hyperacidity may occur with cancer of the head of the pancreas (I have seen a case with a total gastric acidity of 102 per cent.), and anacidity with inflammatory conditions. I have noted complete achylia with biliary calculi.

It is reserved to the examination of the duodenal contents to decide the question of diagnosis. Rather than repeat what has already been several times said in this article, the following scheme is offered portraying the results of the examination of the duodenal juice for bile and pancreatic enzymes:

	<i>Bile</i>	<i>Pancreatic Enzymes</i>
Catarrhal Jaundice	Present	Normally present
Cholelithiasis or Common Duct Stone	Diminished	Normally present (unless associated pancreatitis)
Cancer:		
1—Of the biliary ducts above the junction with the pancreatic system	<i>Absent</i>	<i>Normally present</i>
2—At the head of the pancreas involving both duct systems	<i>Absent</i>	<i>Absent</i>
Pancreatitis (chronic)	Present (may rarely be ab- sent or diminished)	<i>Markedly diminished</i>
Hypertrophic Cirrhosis of the Liver	Increased	Increased
Pancreatic Calculi	Present	Absent

Of what avail is the early diagnosis of carcinoma of the biliary and pancreatic systems? There is an increasing number of surgeons who do not hesitate to attempt the problem of the radical removal of these neoplasms. Czerny, Korte, Kraske, Mayo, Halstead and many others have successfully accomplished this apparently unfeasible operation, with a promising proportion of permanently beneficial results. An early and prompt diagnosis in these dubious cases with the abolition of the present usual waiting period for "observation purposes" will make possible a greater number of surgical attempts and a greater proportion of successful attacks.

After a careful review of the surgical literature, the method proposed and carried out by Kausch (*Beitr. zur Klin. Chir.*, 1912, LXXVIII, 439) seems to be the method of choice. He suggested and has performed a two-stage operation, in the first stage of which a preliminary cholecyst-enterostomy is performed, with the object of relieving the jaundice, improving the nutrition of the patient and diminishing the coagulation time of the blood. In the second stage (which should follow in from two to four weeks), a radical excision of the tumor is attempted. The head of the pancreas as well as the adjoining wall of the duodenum and the common bile duct are removed when involved in or adjacent to the neoplastic mass. The upper end of the severed duodenum is then closed blindly; the distal cut end is drawn over the resected head of the pancreas and sutured *in situ*, so that both bile and pancreatic secretion drain into its lumen. Gastro-enterostomy then completes the operation.

The operation is truly a large undertaking, dangerous to the patient, one with a high operative risk. The operative mortality is about 43 per cent.; death from metastases or late subsequent infection is 38.5 per cent.; permanent cure is 19.5 per cent.

(observed six months to six and a half years after operation).*

One predominating characteristic of tumors in this region offers much encouragement to the surgeon. They grow slowly, remaining relatively small for months, and form metastases late in their course only months after the beginning of the process. This fact, coupled with the prospect that the duodenal tube will offer a means of diagnosis both early and definite, should make the attempts at radical removal of these neoplasms of much greater frequency, and should associate with these attempts the increasingly splendid results that have marked the advance of modern surgery from year to year.

41 WEST EIGHTY-THIRD STREET.

*These figures are compiled from the article by Clermont in the *Rev. de Gyn. et de Chir. Abdom.*, 1913, XX, 33.

THE EARLY DIAGNOSIS OF CANCER OF THE RECTUM.

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Startling is the increase of deaths from cancer during the last fifty years, the latest reports showing an advance of over 200 per cent.! Bell estimates that, at this rate, 25,000,000 of the world's population must die of cancer. Facing this, is it surprising that millions are being spent and men are giving their lives in the study of this grim and devastating disease?

Next to the stomach, the caudal extremity of the human alimentary canal is the most frequent seat of malignant disease.

Bloodgood has well said that in the life history of every malignant growth there has been a moment when it was surgically curable, and the lesions under consideration offer no exception to his admirable axiom. To recognize and to seize upon this precious moment is no less than to control the very destinies of the afflicted individual. Blind as we are to the intimate cause of cancer, we see clearly and distinctly certain remote factors whose very remoteness paradoxically increases their importance.

The termination of the hindgut, which has a blind caudal extremity, forms the rectum, whereas an inflection of the ectoblast forms the anus. Dividing these structures there is a membrane which later breaks down, giving outlet.

This is analogous to the condition at the cephalad end. In the ectoblastic part there is a very abundant lymphatic and nerve supply which gradually decreases cephalad so that 2 to 3 inches from the anus there is at birth practically no sensation. These two factors have great prognostic and diagnostic value. Malignant growths are lethal in direct proportion to their nearness to the ectoblastic tissue, and this is significantly true at both the cephalad and caudad extremities of the alimentary canal.

This complementary relationship of lymphatics and nerves is an undoubted example of the balancing or equilibrating power of nature, always to be found if sought for. As pain is the normal protection of the tissues from injury throughout the body, so in the anus malignancy, or its forerunner, is more quickly recognized by subjective sensations than similar conditions cephalad to the anus. This is what should be expected, for the loss of pain sense is compensated for by proportionate diminution of the lymph supply and of the consequent malignancy.

At best we can only theorize as to the cause of cancer, but it would seem reasonable to suppose, and on this many experienced investigators and surgeons are agreed, that cancer nearly always develops at the site of a chronic irritation. An example is furnished by the men of Kashmir, who wear the Kangri baskets close to the abdomen and a large percentage of whom there develop cancer. Again, the chimney-sweep's cancer is produced by irritation of the scrotum by soot. Smoker's cancer and many other types are familiar examples of this irritation cause. Now, it is a singular fact that cancer occurs most frequently in those sections of the alimentary canal that are subjected to chronic insult and irritation; note cancer of the pylorus and cancer of the rectum. This being the case, chronic constipation must have an important bearing on the development of rectal carcinoma. The same may be said of ulcerative or infectious conditions. The majority of rectal cancers occur at the peritoneal reflection.

The earliest sign of cancer is constipation. This occurs irrespective of the size of the growth or of its encroachment upon the gut lumen. It is equally true of laterally implanted growths, as of the annular types. It is next to impossible, by either catharsis or enemata, to empty the bowel of the fecal mass which accumulates in the dilated pouch just oral to the growth. We have confirmed these observations repeatedly, especially in the case of minute recurrences which could not possibly in themselves offer any excuse for mechanical obstruction, the bowels having been regular since the first

operation and up to a short period before the recurrence. This inhibition is perhaps associated with nature's effort to cause a recession of the growth. It is common practice to associate diarrhea with a new growth, but, of course, diarrhea is not evidence of the absence of constipation, for the most persistent diarrheas are those associated with constipation. The frequent and imperative desire to defecate is not properly a diarrhea, but a mere subjective reflex without objective basis.

The fact that constipation had been noted by the patients themselves is only 30 per cent. of our cases does not mean that constipation is not the first symptom. Many of the patients who complained of diarrhea were in reality constipated, for after thorough catharsis and enemas we found, at operation, impaction of the bowel above the growth.

The presence of mucous and blood in the stools is so common a condition that it attracts little or no attention on the part of the patient. Next to constipation it is the earliest symptom and may even exist before constipation, as any slight irritation of the bowel causes an outpouring of mucous.

The usual history given by a cancer patient is as follows: He will state that up to a certain date he was well, then a change took place, the exact nature of which it is usually difficult for him to describe. This condition was followed by gradually increasing constipation or diarrhea. Subsequently, he had an imperative desire to move the bowels, with a feeling of unfinished stool. This occurred perhaps once or twice a day at first. The movements were explosive; he may have noticed a little blood, clotted passed blood mixed with mucous and feces. Then he was aware of an uncomfortable feeling in the pelvis; knew there was something wrong without being able to define it. As time went by, the desire to go to the toilet became more imperative and more frequent; he had to go several times during the day and the first thing in the morning. A little later on, he suffered from indigestion, sleeplessness, and had to empty his bowels several times during the night. There may or may not be a loss of weight; as a general rule the appetite is variable; occasionally nausea is present. This is the history of the average patient. We have seen cases where the only symptom was a passage of a little blood during or after a movement. Sometimes it is noticed on the paper, at other times in the toilet. We have seen a good many cases where the first symptom was a very severe hemorrhage, followed later by a quiescent period and then the usual symptoms. The history, no matter how carefully taken, is not of great value in the majority of cases, because

there are few patients so observing as to be able to furnish reliable data of their condition. As a general rule, when the symptoms are so pronounced as to attract the attention of the patient the growth is well developed, not necessarily inoperable, but well advanced.

Cancer can be diagnosed in any stage by a protoscopic examination. Unfortunately, protoscopy is not a routine measure and the symptoms are common to other diseases. Therefore, cancer is rarely discovered until it is well advanced. *Unluckily, most physicians share the view of the patient that his symptoms are trivial and they neglect to make either a digital or a protoscopic examination.* Consequently cases are far advanced before they come to the specialist, and anyone familiar with the disease could make a diagnosis from the history alone in this stage. In fact, many patients that come under my observation have already an inkling of their malady.

The symptoms are constipation, diarrhea, blood and mucous in the stools, a frequent desire to defecate and a feeling of unfinished stool. *If, whenever ANY of these symptoms come to our notice, we made a protoscopic examination, cancer would be discovered in a large proportion of cases.* By waiting until all these symptoms are present, the cancer will be well advanced before discovered. If we made this examination regularly, regardless of symptoms, cancer of the rectum would be discovered in its incipency. Early diagnosis is impossible at present because of the lack of a regular, systematic examination of the bowels. This applies, of course, only to cancer of the rectum and the sigmoid apex, but as the rectum, after the stomach, is the most frequent site of cancer in the alimentary canal, we have here a golden opportunity to make an early diagnosis by including protoscopy as a part of a routine procedure in every case coming under our care, just as we now make an examination of the lungs, heart, blood, urine, or feces. Any physician failing to make proper examination of the heart before operating, or of the urine, would be severely censured, yet how many doctors neglect to make a rectal examination! And there is more room for doing good by having a thorough rectal examination than by an examination of the feces. Therefore, educate physicians to include protoscopy in the routine of a general examination; educate the public as to the frequent necessity of this procedure. Just as a patient goes to his dentist every six months, so he should have his bowels examined just as frequently if not oftener. Educate the public to the necessity of an immediate ex-

amination in the presence of any of the symptoms given, either one or all. When the time comes that the public and the physician are educated to the meaning of these symptoms, cancer in at least one part of the anatomy will be discovered in time and cured by operative measures.

In conclusion, let me urge that every patient suffering from constipation, diarrhea, blood, pus or mucous in the stools, especially hemorrhoidal cases, should be protoscoped before measures for relief are instituted. I have purposely omitted other diagnostic adjuvants, such as the Abderhalden reaction, blood reaction, and many others that are useful in cancer in other parts of the intestinal tract, but are superfluous in cancer of the rectum.

The following table gives the results in our operated cases to date:

	Cases Operated Upon.	Recoveries.	Deaths.
Adenocarcinoma	144	106	37
Epithelioma	5	5	
Sarcoma	7	7	
Colloid Car.	2	2	
Scirrhus Car.	2	2	
Malig. Papilloma	6	6	
Malig. Condylomata	1	1	
Malig. Stricture	1	1	
Totals	168	130 (77%)	37 (22%)

Of the 130 recoveries, we have reports from 58 to date: 39 were well without evidence of recurrence after three years, and 19 reported recurrences.

We are now endeavoring to locate and gain further reports from all the cases operated upon, and hope to publish soon a more complete tabulation.

108 EAST SIXTY-FIFTH STREET.

THE AMERICAN SOCIETY FOR THE CONTROL OF CANCER.

The American Society for the Control of Cancer was organized in 1913 as a national association "to disseminate knowledge concerning the symptoms, diagnosis, treatment, and prevention of cancer, to investigate the conditions under which cancer is found, and to compile statistics in regard thereto." The society is conducting in its own field a campaign of education analogous to that of the National Association for the Study and Prevention of Tuberculosis.

Examine the rectum in all cases of tumor of the liver. Likewise, before operating for cancer of the rectum examine the liver for metastasis.

Courvoisier's law usually holds—palpable enlargement of the gall-bladder with distinct jaundice is significant of carcinoma; the jaundice of common duct obstruction by a stone is not associated with enlargement of the gall-bladder.

HAVE "CANCER ON THE BRAIN": A PLEA.

J. H. CARSTENS, M.D.,

Professor of Abdominal and Pelvic Surgery, Detroit College Medicine and Surgery.

DETROIT.

When we consider that one woman out of every eight dies of cancer, and one man out of every thirteen, it certainly behooves us to exert ourselves in every direction to control that great menace to the human race. When we consider that tuberculosis has been checked and controlled to a wonderful extent in the last fifteen to twenty years, we have a right to assume that we can also minimize the terrible scourge of cancer by vigorous efforts.

In the present state of our knowledge we have no remedy or mode of treatment that will check or cure cancer in any stage of its existence, except its complete removal by surgery.

Like all things, a cancer must have a beginning, one that is minute and cannot be seen. A cancerous growth gets to be the size of a millet-seed, then that of a bean, then of a hickory nut, and thus continues to grow. When it is small no lymphatics are involved, and if we find it thus early and cut it out, the system is free of it and continues so. Hence, at the present time the whole question of treatment resolves itself into that of early diagnosis; and the question of early diagnosis almost entirely depends upon the medical practitioners' *looking for the disease constantly*. I know that many people do not consult a physician early enough, for they have no pain, and the disease is all too often far advanced before the doctor is consulted for these cases, and the profession cannot be blamed for those.

In order to make an early diagnosis when a cure by surgery is possible, it is therefore necessary that the members of the medical profession should be constantly on the alert, to have what I call "cancer on the brain" and consider every patient in the so-called "cancer age" to probably have cancer. Yes, it is advisable to look for it in those quite young. I have seen quite a number of people in the last few years, 20, 25, and 30 years old, who had cancer advanced beyond all help.

Every medical man must constantly have before his mind the possibility of cancer, and when that patient complains of soreness in the breasts, excessive flowing, or trouble in the stomach or bowels, or chronic irritation of the skin, *always think of cancer, cancer, cancer*. The greatest difficulty will be to educate the laity, and still as it has been educated on the tuberculosis question, there should be no trouble to do the same thing with the cancer question, if only vigorous efforts are made.

I have induced the Michigan State Board of Health to issue a Cancer Circular (Figs. 1 and 2), which was distributed among the profession and by them among the people. We have also worked with the lay press in writing articles on this subject, in order to *arouse the public to the danger in not diagnosing cancer early enough*. A good deal of that work has been done in the State of Michigan. In some states little has been done in this direction. More should be done everywhere. I have advocated the creation of a certain day in the year to

JULY-SEPTEMBER, 1909

PUBLIC HEALTH, MICHIGAN.

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Lansing, Michigan.

CANCER

AND

HOW IT MAY BE CURED.

READ, AND PASS ON TO YOUR NEIGHBOR

Copies of this pamphlet may be obtained, without cost, by addressing the
Secretary, Lansing, Michigan.

[Entered at the Postoffice, at Lansing, Michigan, as second-class matter,
under Act of March 3, 1879.]

Fig. 1.

be called "Cancer Day," when every newspaper in the land should print an article on the subject, and every minister should preach from the pulpit on the cancer question, and every doctor should talk all that day wherever he goes on *cancer, cancer, and nothing but cancer*.

If every physician would thoroughly examine every case, he will be able to make a diagnosis early, when something can be done. If every woman with an excessive or an unusual vaginal discharge will be examined, if a little tissue be removed from the uterus which looks suspicious, and this be subjected to microscopic examination, many cases of cancer will be caught at the very beginning. And if every lump in the breast will be removed, every cyst, hardening or induration, or ulcer extirpated and subjected to a thorough pathologic examination, cancer will often thus be diagnosticated early. If

every stomach or bowel trouble, instead of being allowed to drag along, would be subjected to a thorough investigation, if necessary even to an exploratory celiotomy, many more cancer cases will be recognized early. *If we can get the lay people to understand that an excessive flow, or irritating discharge, and a little enlargement or growth, or a continuous pain may mean uterine cancer, and that the medical man should be consulted early, much*

CANCER

AND

HOW IT MAY BE CURED.

I.

CANCER IS CURABLE.

Cancer is curable, if it be operated upon in its early stages.—If it be left to grow and develop, cancer is always fatal. It may be partially removed when in an advanced stage, and relief may be had for some time after operation, but beyond the early stage, cancer cannot at present be permanently removed, nor permanently cured. Permanent cure of cancer is possible if the afflicted person obtains an early diagnosis, and receives early attention from a skilled surgeon. The only permanent cure for cancer known at the present time is early surgical operation.

II.

HAVE OPERATIONS FAILED TO CURE?

Very few persons die from operation performed by skilled surgeons for the removal of cancer. Where cancer operation is done by experienced surgeons, the fatality in America for the past fourteen years is less than one case out of a hundred,* or in other words, ninety-nine persons out of a hundred survive operation for cancer.

* The Cancer Question, by John E. Summers, in The New York Medical Journal, February 27, 1909.

Fig. 2.

untold misery may be prevented and many lives prolonged. *It is carelessness that prevents the early recognition of this great scourge.*

Until we find the real cause or some specific cure, we are forced to preach the doctrine of early diagnosis and surgery, and in order to do that we must allow ourselves to be accused of having "Cancer on the Brain," by preaching, day in and day out, the story of cancer, cancer, cancer.

1447 DAVID WHITNEY BUILDING.

MAMMARY INVOLUTION AND CANCER.

I wish to state it as my conviction, and to state it as positively as I can, that it is not possible for mortal man to differentiate between cancer and abnormal involution in more than three-fourths of the cases. I do not care how closely one studies the remaining 25 per cent., he will not be able to make an accurate diagnosis before operation.—WILLIAM L. RODMAN, in the *Pennsylvania Medical Journal*.

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WALTER M. BRICKNER, M.D., Editor

NEW YORK, JULY, 1915.

THE EARLY TREATMENT OF CANCER.

The propaganda to educate the public to the danger of ignoring the early signs and symptoms that may betoken the development of cancer, an altogether desirable propaganda, will surely aid much in the universal fight against this great and common menace to human life. Very many women appreciate that a lump in the breast is a serious condition; women—still far too few of them, to be sure—are also slowly learning that irregular bleeding and vaginal discharges are not to be ignored as inconsequential accompaniments of the menopause. And so we may expect by public instruction that many people may yet be brought to realize that persistent "dyspepsia," developing constipation, a bloody stool, a single hematuria, are also signs that may portend a malignant growth and must be competently investigated.

Yet, obviously, there are limitations to what the education of the public can accomplish towards bringing about the early recognition and treatment of malignant growths. What is more important is to impress the members of the medical profession generally—the custodians of the people's health—with the responsibility that presses upon them of making *early* diagnoses of cancer by the employment, in every case that suggests the possibility of such a condition, of all the diagnostic aids that such case may require.

Pursuant of such purpose, and at the commendable suggestion of the Cancer Commission of the

Pennsylvania State Medical Society, the JOURNAL, synchronously with many other medical journals, is devoting this issue exclusively to *Cancer*. We commend to our readers, however familiar they may be with the subject, the careful perusal of all the excellent contributed articles. Written by men of authority in their specialties, they deal with the early diagnosis of cancer in each of the regions of the body, except the skin, in which it commonly occurs. All of these articles preach the same text: that our present means of treating cancer must be invoked when the disease is still young, that there is no clear-cut symptomatology of early cancer in any part of the body, that there is no known treatment to be considered other than radical extirpation. The very interesting article of Dr. Woglom emphasizes from the pathological side these clinical dicta.

Surgery is not an ideal treatment for cancer, it is not, speaking generally, even a satisfactory treatment. But it does save lives; and the numbers of its failures to do so are directly in proportion to the delays in invoking its aid.

There is, as yet, no specific test for the presence of a cancer in the body, and so, if the disease is to be recognized and dealt with early, *it must be sought for*. Every symptom that suggests the possibility of a neoplasm must be studied *thoroughly* until it is *adequately* accounted for. To dismiss such symptoms as inconsequential, to "observe" them until they become outspoken evidences of malignancy is to place upon oneself the responsibility for the death of a fellowman. Repeated headaches and failing vision, pains in the jaws and ears, ulceration of the skin, tongue or mouth, developing hoarseness, dysphagia, persistent pain in the chest or dyspnea, lump in the breast, persistent "dyspepsia," developing constipation, bloody or mucous stools, a single hematuria or difficulty in urination, irregular uterine bleeding or discharge, "sciatica," "brachial neuritis"—each one of these, and many other such symptoms, must be promptly investigated as of possibly cancerous source by all the necessary diagnostic means—ophthalmoscopy, laryngoscopy, esophagoscopy, procto-sigmoidoscopy, cystoscopy, radiography, careful palpation, chemical analyses, tissue removal by knife or curette for microscopy, *early* exploratory operation. Nothing less than these will do. No less thorough investigation will discharge the obligation to the patient to determine the possible presence of a cancer while it is still curable.

No longer can the excuse be accepted that a community does not afford the facilities for these

examinations. The rural practitioner must, as very many of them indeed do, equip himself competently to conduct many of these examinations. For the other tests and examinations, there are few communities in this country which are too remote from those who can conduct them. Neither distance nor poverty will excuse failure to secure adequate pathological or other investigation. The medical profession, rural and urban, never has and never will deny its aid to those who cannot pay for it. *The responsibility is ours. The time to think of cancer is always. The time to deal with it is before it has passed beyond the stage of doubtful diagnosis.*—W. M. B.

THE EARLY DETECTION OF UTERINE CANCER.

Even though there may be forthcoming a reliable serum test for the presence of cancer in the body, we shall still be confronted in many cases with the problem of locating the growth. Between carcinoma and syphilis there is the very important distinction that the former remains local for a comparatively long time, during which there are none of the constitutional phenomena indicative of a blood infection. Moreover, the initial lesion in syphilis is usually situated on the surface of the body, where it may be readily seen. *Concealment* and *insidiousness* are the lurking characteristics of visceral cancer; its real malignancy lies more in this concealment than in the other ravaging symptoms that it is responsible for.

Hemorrhage and metastasis, near and remote, are signs of a well-established cancer. When one has these symptoms the possibility for a cure becomes very doubtful. Some cancers grow to a very large, practically inoperable size without giving rise to any alarming symptoms. There are other cases in which the first sign of a lurking cancer is well-marked cachexia; the growth in these instances of a decidedly proliferating type and of extreme malignancy. Only infrequently does a cancer cause symptoms early and for a long time before it becomes inoperable.

True early symptoms, that is, before ulceration and necrosis occur, are unknown. Educational propaganda intended to inform *women* concerning early symptoms are well meant, but very little hope can be attached to it. To get early cases *physicians must seek them*, must be constantly on the lookout for them. Newspaper publications may urge upon women of child-bearing age and older the importance of having themselves examined at stated intervals. That is all the medical profession should expect of the lay public and that is all we may de-

mand of them. *The burden of discovering cancer early rests with the medical profession.*

Until the laity is educated to this routine prophylactic examination we may avail ourselves of the opportunity offered by the clinical examination that women submit to for other affections of the body, to exclude or detect cancer of the uterus. We feel that no physical examination in a married woman is complete without investigating the status of the generative organs, and no examination is complete without determining whether there is suspicion of a cancer. The exclusion of the latter should be as much the clinician's duty as the exclusion of tuberculosis.

The methods of inquiry for the presence of cancer are not very difficult; they entail no complicated serological technic. They are well-established methods of physical examination. They include *careful palpation, careful inspection, the introduction of a uterine sound in every instance of suspicion of cancer* where pregnancy can be excluded, *diagnostic curettage, diagnostic excision* (biopsy), and the *resort to pathological examination of this material*. It may further be added that many an unsuspected carcinoma is discovered in the laboratory where careful routine examination is made of all organs and parts of organs that are removed. It is well to remember in this connection that of approximately 600 specimens of uterus removed for other reasons than cancer, the latter was nevertheless found by Schottlaender twelve times, *i.e.*, in 2 per cent. of cases. These could undoubtedly have been located by careful gynecological examination supplemented by the minor surgical operations recommended.

True, early cases of cancer will probably be encountered very infrequently in spite of the most painstaking search. It is encouraging to think, however, that of 135 cases of uterine cancer in Schottlaender's series, eight were found to be of very young growth, so much so that the parametrium was free in all of these eight cases. There is no reason why ultimately the percentage of early cases should not be increased. There is no reason why the experience acquired by gynecologists abroad should not also in time come to us.

While our endeavors are bent in the direction of establishing an early diagnosis of cancer of the uterus, one immediate effect will be to make the inoperable cancer a thing of the past; the great body of women suffering from cancer of the uterus will then get the benefit of surgical treatment when a permanent cure may be confidently expected.—I. C. RUBIN.

Surgical Suggestions

It should be impressed upon women that the prognosis after hysterectomy for carcinoma confined to the body of the uterus is usually good.

Bismuth x-ray pictures may reveal a carcinoma of the bowel too small to be palpated through the abdomen and too high to be seen or felt through the rectum.

It is awkward to determine only on the operating table that a patient prepared for a hemorrhoid operation has a cancer of the rectum. It is also inexcusable.

The youth of a patient should not be allowed to allay a suspicion of cancer. Cancer occurs in the breast of very young virgins; it is by no means unknown in the rectum of young subjects.

The shrinkage or even almost total disappearance of a carcinomatous mass from the injections into it of any medicament is not to be taken by itself as indicating a specific value for that medicament.

The discharge of blood and mucus with the stools, or without them, is always suspicious of a carcinoma of the lower bowel. If none is felt in the rectum, examine the bowel above with the sigmoidoscope.

Cancer of the cervix uteri is essentially very malignant and only when it is recognized early can the hope of cure be held out, even if submitted, as it should be, to radical hysterectomy.

Hematuria is usually the first sign of a bladder cancer. The passage of bloody urine, even though it is not soon repeated, is sufficient indication, in an adult, for a cystoscopic examination.

Cancer of the *body* of the uterus, not extending beyond the viscus, is one of the least malignant forms of carcinoma and a permanent cure after simple hysterectomy may be anticipated.

If more of the profession would come to look upon the uterine curette as a diagnostic instrument chiefly, more women would be saved from the development of inoperable uterine cancer.

The recognition of cancer of the stomach and intestine in x-ray pictures requires experience. If

the roentgenologists in your community haven't that experience it is probably because you and your colleagues haven't encouraged its development. Your patients are the chief losers.

The gravest danger from postponing operation for cholelithiasis is the development of carcinoma of the bile tract. Empyema, gangrene and rupture of the gall-bladder are more common sequelae, to be sure, but even these late developments of cholelithiasis are usually amenable to prompt surgical treatment.

A condition sometimes mistaken for breast carcinoma is enlargement of one or more of the anterior thoracic (lower axillary) lymph glands, usually due to an infection (*e.g.*, a furuncle) about the "corset line." It causes a swelling, often deceptively hard at first, close to the upper, outer border of the breast.

Marked constipation (not habitual), mucous and bloody discharges, with or without pain and loss of flesh, not promptly yielding to treatment, are sufficiently significant of a neoplasm to indicate the necessity for an exploratory laparotomy, if colonoscopy, radiography and palpation have failed to locate the lesion.

If constipation develop in an adult, exclude intestinal neoplasm before treating the condition as functional. Carcinoma of the sigmoid, for example, may exist for some time without any other symptom than constipation until obstruction or perforation suddenly develops. Sigmoidoscopy or bismuth x-ray examination will usually locate such a condition. These should be employed, therefore, in cases of recent adult constipation of unknown cause.

Operation for adenoma of the prostate (so-called prostatic hypertrophy) should not be long delayed if the patient is a "good surgical risk," even though obstruction is not marked nor continuous, for sometimes these adenomata conceal small areas of carcinoma, unrecognizable except by the microscope. Removed thus early, the patient is usually cured; left to grow into the capsule and surrounding tissues, the condition is usually hopeless.

ANNOUNCEMENT.

Much interesting cancer information, contributed and editorial, we were obliged to omit from this issue for lack of space. This will appear in the August number of the Journal.

American Journal of Surgery

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[American Journal of Anesthesia and Analgesia]

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JULY

1915

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THE FIRST MAJOR OPERATION UNDER ETHER IN ENGLAND.

F. WILLIAM COCK, M.D., F.S.A.,
LONDON, ENGLAND.

"Mihi mandatum ex memoriae anima ut temporis ruinas restituam."

"Semper sussurat memoria sed aliquando clamat."

It was a little after midday on Saturday, December 19, 1846—according to Surtee one of the worst days of the worst hunting season on record—when Robert Liston came into his friend Peter Squire, the well-known chemist of Oxford Street, and, pulling out a letter, said to him: "Just read that." The latter, a middle-aged, gray-haired man, glancing through the pages, replied: "This is most interesting and important." "Yes, and you must fix me up something so that we can have it on Monday at the hospital. I have an amputation of the thigh to do, and we will try it then." And hastily bidding Squire farewell, Liston, the surgeon, great not only in reputation, but in stature, hurried off on his busy round.

The letter was from Dr. Francis Boott, a general practitioner, living in Gower Street, in whose house that morning a firmly fixed molar tooth had been extracted from a young lady by Mr. Robinson, the dentist, while she had been insensible under ether. Dr. Boott had shortly before received from Dr. Bigelow of Boston an enthusiastic account, dated November 28, 1846, of the success of ether anesthesia in the Massachusetts General Hospital, where it had been introduced by Morton, the den-



Fig. 2. Robert Liston at the age of 30.

tist, to Dr. Warren, who had operated on patients under its influence.

As Peter Squire was thinking the matter over, his nephew William, afterwards Dr. Wm. Squire, MD., F.R.C.P., came in and, after talking about it, said: "Why not try it on me first?" "Come in to-morrow, and we will see what can be done," was the reply. To-morrow, Sunday, came and William Squire was there early. His uncle had fitted together a Nooth's apparatus and packed the upper detachable cylinder with a sponge and to the exit a flexible tube was attached with an ordinary bronchial inhaler mouth-piece. This afterwards had an expiratory valve attached. Pouring some sulphuric ether on the sponge, he said: "Lie down on the couch there. Take the mouth-piece between the teeth, close the lips over it, and hold the nose firmly." The young man did as he was bid and soon began to cough, for he was practically inhaling ether as if he had applied a Clover apparatus turned on to the full, but without the bag attached. After a time, however, he became more accustomed to the pungent vapor, and finally was completely anesthetized. When he recovered, his uncle, discussing the matter, said he would be wanted to help at the hospital next day in administering the ether.

In the University College Hospital lay Frederick Churchill, a butler, aged 36, for whom these mo-



Fig. 1. Peter Squire, the well-known Chemist of Oxford Street, who made the first ether inhaler. (From a contemporary portrait lent by his son.)

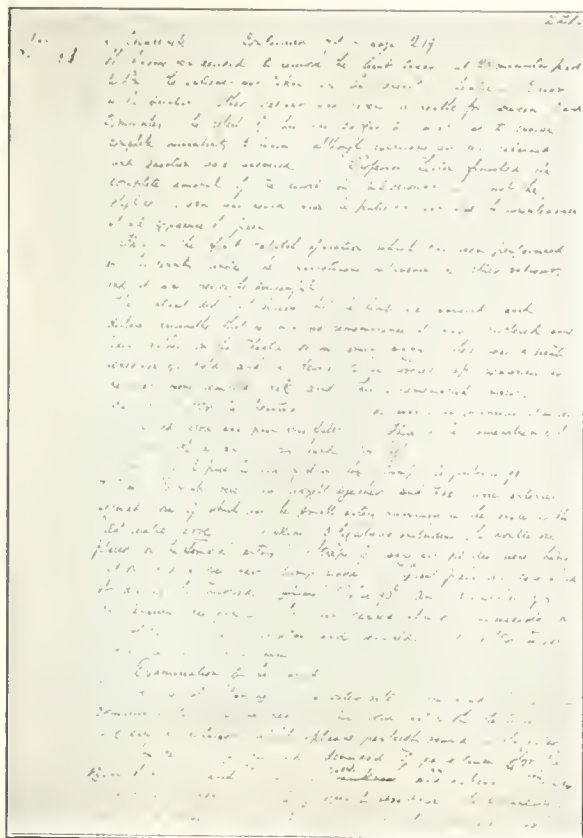


Fig. 3. The record of the first amputation under ether in Liston's case-book.

mentous preparations had been made. He had been admitted on Monday, November 23, 1846, for a discharging sinus from a cavity in the outer side of the head of the tibia. This cavity had been opened before admission, and a number of irregularly shaped laminated bodies removed. The mischief had originally been caused by a fall on the part. "On November 25, Professor Liston examined the sinus with a probe and an incision was made opposite to the tibio-peroneal articulation, and the finger being passed down, bare bone was distinctly felt on the outer head of the tibia. The wound was plugged, but prior to this an attempt was made to ascertain whether the diseased portions of bone were loose; this was found not to be the case. Water dressings were ordered and complete rest." Then the notes go on to give at length a singularly accurate picture of a septicemia induced by the above examination, with fever, night sweats, patchy pneumonia, limb startings, and all the miserable concomitants of infection with the germs attached to the unsterilized hand and instruments of the finest and cleverest surgeon of his day, who had done everything well and correctly according to the best knowledge then available. At last the poor patient was told he must lose his limb to save his life, and he gave his consent, glad to be rid of his torment.

On December 21, the scene changes to the operating theatre of the old hospital, so well known to the past generation of students. When the writer first knew it, it was practically in the same state as in Liston's time. Two sliding doors separated it from the main corridor of the ground floor of the hospital. They were exactly opposite the east door, where the present entrance now is, and almost on the spot where the bust of the new founder of the hospital stands. When one entered, on the right was a small hand wash-basin, on the left the instrument cupboard, which still held a good many of Liston's instruments. In the middle was Liston's table, screwed to the floor by angle-irons. There was a low, sturdy wooden chair, which was used by the surgeons chiefly for cases of piles and lateral lithotomy, or to hold instruments. Then at the foot of the benches came the seat on which sat the staff and visitors, and now and then the senior house surgeon. Above and extending round this were the railings which separated the rising tiers of benches for the students, the lowest one being for the dressers and the junior staff. These railings are now in the writer's garden at Appeldore, in Kent, and with the exception of the table and chair, are, he believes, all that is left of the old hospital. At the foot of the table was a wooden tray filled with sawdust. In front of the instrument cupboard was a small four-legged table; on this the instrument porter put out what was wanted for the day, and to him used to go the anxious examinees to find out the different requirements for various operations, just before their visit to the Royal College of Surgeons.

To return to our story. It is one o'clock: there



Fig. 4. Early portrait of William Squire, M.D., F.R.C.P. (From a photo lent by his son, J. Edward Squire, C.B., M.D., F.R.C.P.)

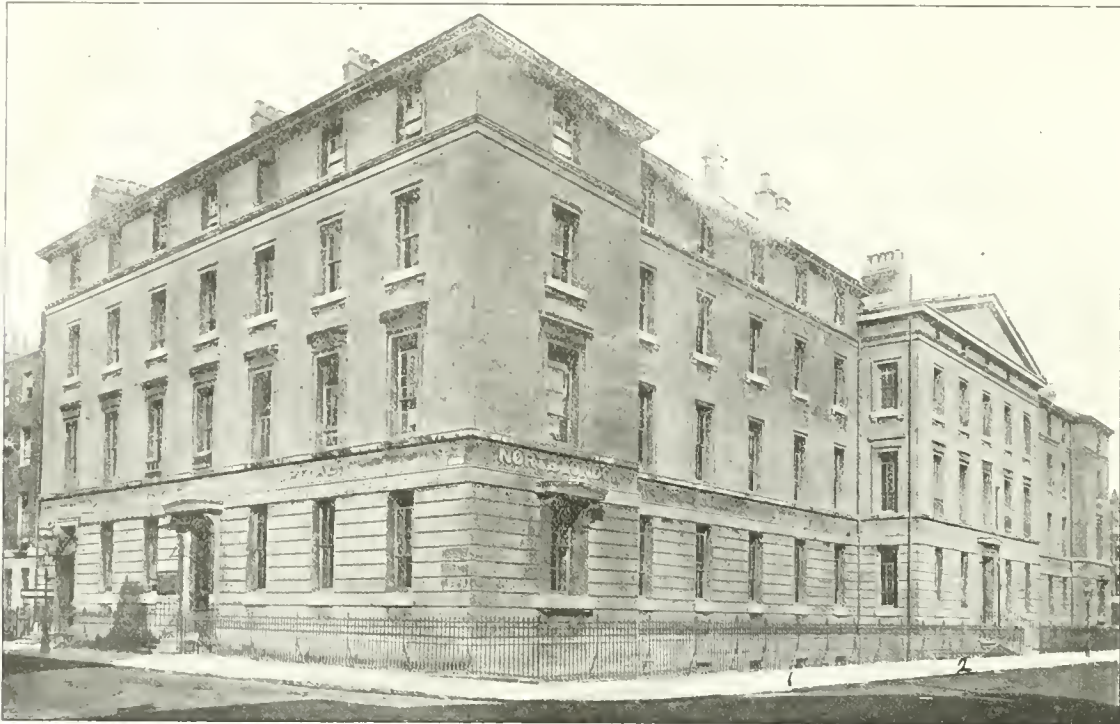


Fig. 5. Old University College Hospital. Fig. 1 opposite Ward 1. Fig. 2 shows the room of Liston's House Surgeon.
(From a photograph lent by Messrs. H. K. Lewis.)

is much bustling to and fro, for it has got about that Liston is going to try something absolutely new at his operations. It is even said that the secret of anesthesia has been discovered. The theatre has already become crowded; soon it is to be crammed to the uttermost. Presently comes William Squire. He moves quietly about, a small table is brought in, and the strange-looking chemical apparatus placed upon it. The flexible tube is adjusted to reach the middle of the pillow on the door end of the table, and the students are conscious of that penetrating odor, now so common, then only known in mixtures for bronchitis, or, when given in small doses, for inhaling in asthma. "Is there any one here who would like to try this?" says Squire. No one replies from the crowded benches. "What, no one!" and looking round he sees one of the hospital porters, Sheldrake, a big, muscular fellow. "Come on, man, let's see if we can put you under." So the porter lies down on the table and sucks away at the tube, young Squire holding his nose. But, after a minute or two, Sheldrake jumps up off the table, and quite intoxicated, shouting and making a tremendous to-do, climbs onto the railings and plunges into the mass of students, who are like a flock of sheep when a dog chases it, separating right and left and letting him nearly reach the door.

Just in time they close on him, and laying hold firmly, keep him till he has quieted down, and then

he goes off by the stairs, vowing that he will have no more of the d—d stuff. Then things settle down to the strained waiting which goes before any great event. William Squire rearranges the apparatus, the table is put straight again, not before one had seen, when the mattress fell off, the key-hole apertures on either side of the planks, where the straps go through, which are used to hold down the unfortunates who have to endure the agony of the knife. The well of the theatre is now almost full; it is 2:15 p. m. A firm footstep is heard, and Robert Liston enters—that magnificent figure of a man, six feet two inches in height, with a most commanding expression of countenance. He nods quietly to Squire, and turning round to the packed crowd of onlookers, students, colleagues, old students, and many of the neighboring practitioners, says drily: "We are going to try a Yankee dodge to-day, gentlemen, for making men insensible."

He then takes from a long, narrow case one of the straight amputating knives of his own invention. It is evidently a favorite instrument, for on the handle are little notches showing the number of times he had used it before. His house surgeon, Ransome, puts the saw, two or three tenacula, and the artery forceps, named after the operator, onto the chair close by, and covers them with a towel, then threads a whisp of well-waxed hemp ligatures through his own buttonhole. "Ready, Mr. Ran-

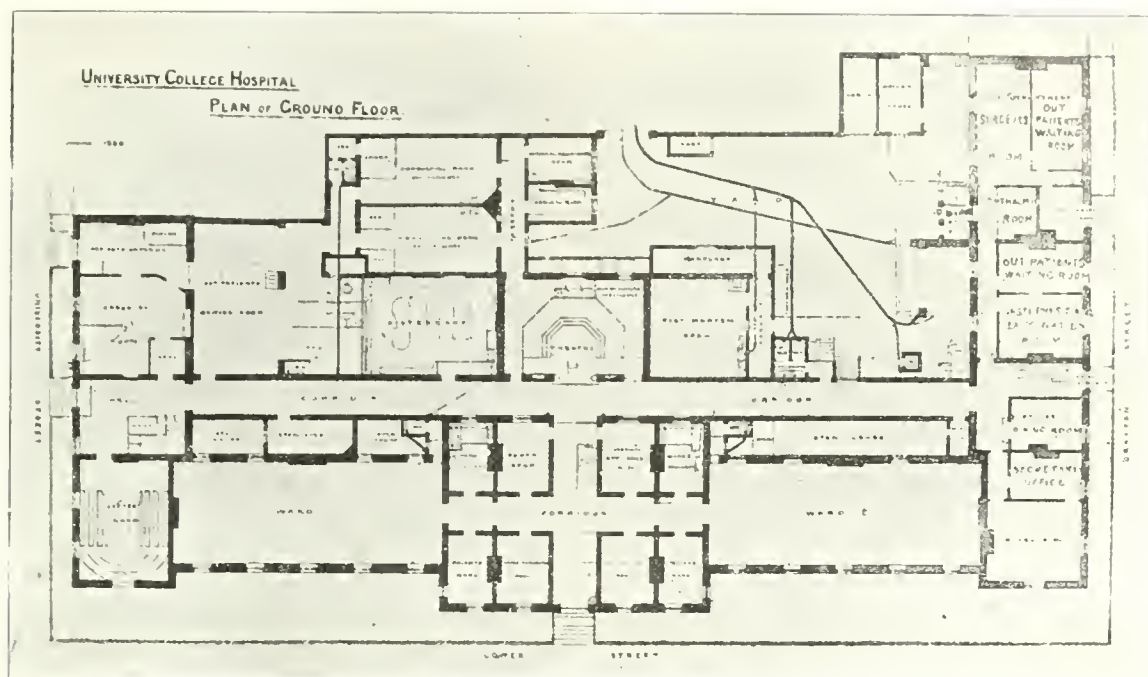


Fig. 6. Ground plan of the old University College Hospital, showing the operating theatre and Ward 1.

some?" "Yes, sir." "Then have him brought in." "Run along, Palmer," and Edward Palmer, the dresser, goes quickly through the sliding doors across the main passage towards the east door of the hospital, and turning sharply to the right, enters Ward 1. The porters are waiting just outside, and the patient is carried in on the stretcher and laid on the table. The tube is put into his mouth, William Squire holds it and the patient's nostrils. A couple of dressers stand by to hold the patient if necessary, but he never moves, and blows and gurgles away quite quietly. Liston stands by, trying the edge of his knife against his thumb-nail, and the tension increases; the patient's breathing gets deeper, more ether is dropped on the sponge. William Squire looks at Liston and says: "I think he'll do, sir." The tube is removed and a handkerchief laid over the patient's face. "Take the artery, Mr. Cadge," cries Liston. Ransome, the house surgeon, holds the limb. "Now, gentlemen, time me," says Liston to the students. A score of watches are pulled out in reply. The huge left hand grasps the thigh, a thrust of the long, straight knife, two or three rapid sawing movements, and the upper flap is made; under go his fingers and the flap is held back; another thrust and the knife comes out in the angle of the upper flap; two or three more lightning-like movements and the lower flap is cut, under goes the great thumb and holds it back also; a touch or two of the point and the dresser, holding the saw by its end, yields it to the surgeon and takes the

knife in return—half a dozen strokes and Ransome places the limb in the sawdust. "Twenty-eight seconds," says William Squire. "Twenty-seven," says Buckell, a student, still living. "Twenty-six," echoes yellow-haired Russell Reynolds. "Twenty-five seconds, sir," says proud Edward Palmer, the dresser, to his surgeon, who smiles in reply. The femoral artery is taken up on a tenaculum and tied with two stout ligatures, and five or six more vessels with the bow forceps and single thread, a strip of wet lint put between the flaps and the stump raised. Then the handkerchief is removed from the patient's face, and, trying to raise himself, he says: "When are you going to begin? Take me back, I can't have it done." He is shown the elevated stump, drops back and weeps a little; then the porters come in and he is taken back to bed. Five minutes have elapsed since he left it. As he goes out, Liston turns again to his audience, so excited that he almost stammers, and hesitates and exclaims: "This Yankee dodge, gentlemen, beats mesmerism hollow."

Let us follow the patient for a little, and we cannot do better than again to have recourse to the notes. "Not the slightest groan was heard from the patient nor was the countenance at all expressive of pain. This was the first capital operation which had been performed under the narcoting influence of ether vapor, and it was perfectly successful. The patient did not know that the limb was removed and declares distinctly that he has no re-

membrane of having suffered any pain, either in the theatre or coming away. There was a great sensation of cold and a desire to be covered up expressed as he was being removed back; and this is remembered now one hour after the operation. It was some minutes after being laid in bed before any pain was felt. There is a remembrance of 'something like a wheel going round his leg.'

"3.30 P. M.—Much pain is now felt in the stump; the pulse is 90.

"7 P. M.—The flaps were now brought together, and two more arteries secured, one of which was the small artery running in the center of the great sciatic nerve, making ten ligatures, including the double one placed on the femoral artery. Strips of isinglass plaster were then put on, making a very neat stump. Great pain was complained of during this proceeding. Pulse 90 and expression of countenance cheerful; the pain ceased almost immediately on the flaps being brought together and secured."

The notes go on to say that examination of the limb showed extensive ulceration and destruction of the knee-joint and surrounding tissues. The patient made the usual tedious recovery common in those days, with offensive suppuration and slow granulation. The ligature of the femoral artery came away on the twentieth day. He was discharged cured on February 11, 1847.

It is the same night and the scene is Liston's dining-room at 5 Clifford Street, Old Bond Street. He has had a dinner party and can talk of nothing but the wonderful occurrence of the afternoon. When dessert is about to be removed he proposes



Fig. 8. The D'Osay lithograph portrait of Liston.



Fig. 7. Railings of the old operating theatre, University College Hospital, now at the Well House, Appledore, Kent.

to the company that he shall experiment with William Cadge, his assistant, afterwards the celebrated surgeon of Norwich. So Cadge lies down and obediently sucks away at the tube of the apparatus which had been brought round to the hospital; he hears one of the ladies present say: "Liston, I won't stand it; you'll kill that poor young man." But Liston only laughs and goes on holding down the poor young man by the ears, until he is insensible. But, as Cadge tells afterwards, his powerful thumbs were so strong that he felt the effects of the compression for a long time.

The case of Churchill was one of narcotic anesthesia, not of complete insensibility, as it is recorded that the patient spoke and answered questions while on the table, although totally insensible to pain; but it settled once and for all, in England, the fact that anesthesia was possible. In rather less than six months it is recorded by Mr. (afterwards Sir) William Ferguson that the novelty of ether anesthesia for operations belonged to the past.

At this point I should like to repeat the account given to me, in a recent interview, of an exactly similar operation done by Liston without anesthesia, a week or two before the celebrated one just described.

Through a medical friend, who was interested in



Fig. 9. Wm. Cadge, F.R.C.S., Liston's Assistant. (By permission of the *British Medical Journal*.)

my historico-medical researches, I was introduced to possibly the last surviving amputation-patient of the great surgeon, and spent a most interesting hour listening to his recollection of the event.

In 1911, at the time of my interview, he was an old man of 77, and when about 13 years of age had had a white swelling of the left knee-joint. This had arrived at the stage of night sweats with painful limb startings, when he was sent to the University College Hospital and placed in the private section of Ward IV. From his description, it seems that at that time medical and surgical cases were often mixed in the general wards. A day or two after his arrival, Liston came in and asked when he would like to have the operation. "Will it hurt?" was the anxious query. "No more than having a tooth out," was the encouraging reply. "Oh, I'll have it done to-morrow (Saturday), then I shall be all right on Sunday. "Very well, so be it."

I asked him if he recollected Liston's appearance. He said that he could not remember his face, but that he had an extraordinarily pleasant voice, and that he was very kind. He also remarked that Liston was a very big man and bald, thus bearing out the portrait taken about the beginning of 1847.

Well, on the day of the operation, he was blindfolded and taken downstairs to the theatre, laid on the table and held firmly there. "Was the operation very painful?" "No, although I was bellowing all the time, it was not; but, then, he only took twenty seconds to take off my thigh." This tallies exactly with the recorded quickness with which the best surgeons then operated.

My old friend described the operation almost in the words of Liston's own text-book, and though it was of short duration, he says that he counted the strokes of the saw, which were six. When he was told that the limb was off, he replied: "That's a lie," hardly believing it, owing to the extreme rapidity of the operation. The next thing he remembers was something put between his teeth, which turned out to be a feeder with port wine. He had a good suck at this, and by the time he had finished it the arteries had been tied and he was carried back to bed. The after procedure was exactly as described for the anesthesia case. During the evening the flaps were adjusted after the wound had glazed over and three stitches put in the edges. This he described as the most painful part of the whole business.

He remained in the hospital six weeks and left cured. With the aid of an artificial leg he went through the sixty-five years that followed quite successfully and usefully, and in 1911 was still active, both in body and mind. On being asked whether he recollected anything else about Liston, he replied: "Yes, one day he was doing an eye operation in the ward, at which he was very skillful, and



Fig. 10. The Nouth respirator transformed by Squire into the first English ether inhaler.

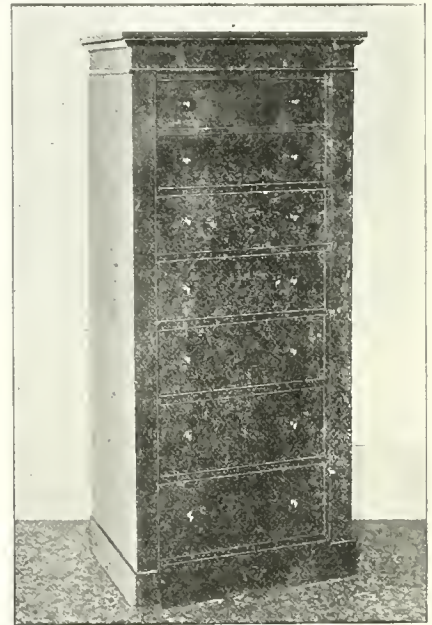
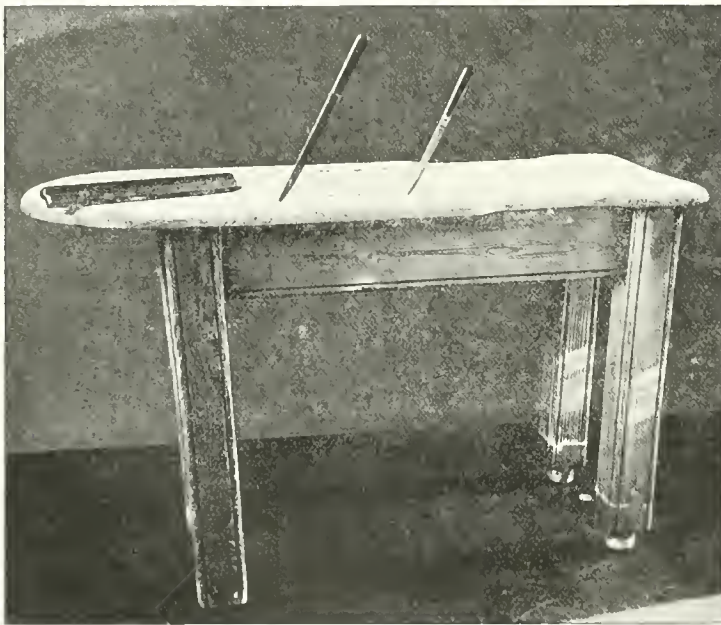
remarked that it was a somewhat niggling job. "Oh," said the head nurse to my friend, "Mr. Liston likes something to carve at." This shows that as late as 1846 there was no ophthalmic surgeon at the University College Hospital. In the provinces, the general surgeon still often follows this practice of doing eye as well as ordinary surgery.

Now comes the corroboration of a legend that was current in my time at the University College Hospital, for my old friend was an actual witness of the following: There was a patient in Ward IV who had something the matter with his shoulder, and he was told on a certain day Liston would operate on him. When he was sought for he could not be found. So another day was arranged and he

I expect that in preanesthetic times patients often ran away and tried to hide, and that not once nor twice Liston had to forcibly extract his unwilling patients from cloacinian and other refuges. Talking of the pain of the operations, it is recorded that one of Liston's lithotomy patients, on whom he successfully operated, declared that the sensation was not worse than that of being shaved with a blunt razor. This, if not quite the same, is not far off the poet, who, being operated on by Cheselden, the greatest of lithotomists, wrote:

"So swift thy hand, I could not feel
The progress of the cutting steel."

Thus it has fallen to me not only to meet with probably the last preanesthetic thigh amputa-



Figs. 11-12. Liston's operating table and knives, with their case. (From a photograph lent by Mr. C. J. S. Thompson, Curator Wellcome Medical Museum.) Liston's instrument cabinet, in the possession of the late Colonel Liston.

was not informed of it. The day arrived and the table was placed on the landing just outside the ward. When they came to the patient's bed he was again absent, but he had been noticed to take cover in the lavatory. This was found to be bolted. Liston sent for a table knife, and, slipping back the bolt, opened the door, picked up the patient by the seat of his breeches and ran him along to the table, and then, by a twist of the wrist (he was an expert and very powerful wrestler), turned him on the table and then performed the operation. My old friend saw all this as he lay in his bed with the door open. The tradition was that the man escaped from the theatre, Liston ran after him, burst open the door, carried him back to the operating room, strapped him up and cut him for stone, and that it was all done in two minutes.

tion case done at the University College Hospital, and to gather together the accounts of the first under the influence of anesthesia, but also, when a dresser in 1879, to extract some fragments of bone from the stump of a Syme's amputation, the owner of which informed me that he was the last patient Liston operated on in the University College Hospital.

My friend Dr. Bruce, who was house physician about 1860, tells me that there were many stories of Liston still current in the University College Hospital at that time. On one occasion, coming into the ward late in the evening, he found a big lad who had a badly fractured arm with commencing gangrene, owing to too tight a bandage under the splint. Pointing out the evident signs to his house surgeon, he picked the boy up, took him to the

theatre, and amputated then and there. On another occasion he was very sarcastic at the expense of his house surgeon, who was afterwards my revered friend, Sir John Erichsen, because he had opened an abscess of the calf transversely rather than longitudinally; but we all know the specimen of the aneurysmal tumor of the neck, now in the hospital museum, into which Liston plunged a knife, thinking it was an abscess only. On seeing a jet from the carotid, he said: "Give me a hair-lip pin,"



Fig. 13. James Robinson, the dentist, who first gave ether for the extraction of a tooth in Europe, Dec. 19, 1846. (Courtesy of Dr. Hoag.)

passed it through, and fixed it, adding, "To-morrow we will tie the carotid." He did so, but the patient ultimately died; the case being one of scorfulous glands with suppuration opening into the vessel. Even Homer nods.

Liston came of an artistic family, his father, minister of a parish in Scotland, being the inventor of a remarkable pipe-organ. He himself was a good singer and had his house filled with musical and artistic people. We read of him dining at Lady Blessington's, and the last public portrait taken of him was the tinted lithograph done by Count D'Orsay, just six months before his death. He was fond of hunting, shooting and yachting.

Although rough and authoritative when in action, as of necessity were all good surgeons in those pre-anesthetic days, yet he is always described as a kind

and most considerate friend to the poor and helpless, and his loss was lamented not only by the rich, but by an enormous crowd of those to whom his charity had been extended.

One or two more little touches. His daughter, who still survives, says, that when out driving with him on operation days he was always very silent and absorbed; and the late Colonel Liston wrote to me, that as a boy of nine, his recollection of his father was that of a most excellent companion, who,

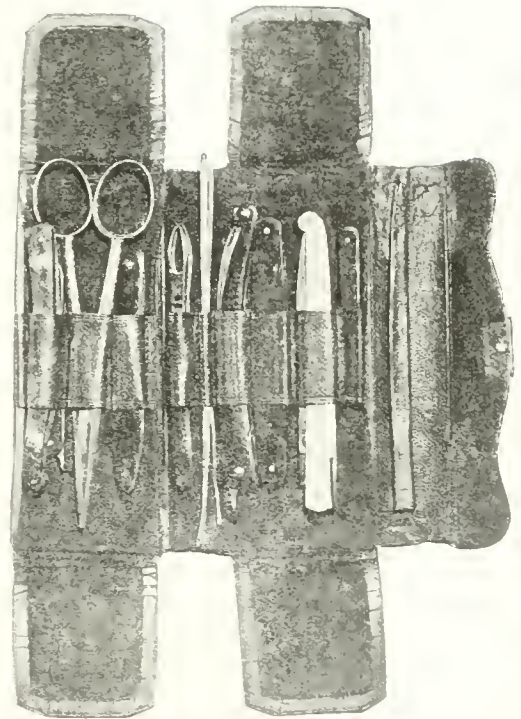


Fig. 14. Liston's pocket instrument case.

when he drove with him, always gave him the shilling from the guineas received at the houses to which he had been called as consultant.

Once more the scene changes. Not quite a year after Churchill lost his leg under ether, a funeral procession slowly climbs Highgate Hill, accompanied by more than 500 medical men and students, friends and pupils of Robert Liston, who has just departed this life, prematurely, at the age of 53, from the effects of an aortic aneurysm, caused by the blow from the boom of his yacht. The service is held in the parish church, the coffin is carried into the adjoining cemetery and left on the top shelf of one of the arches of the terrace catacomb. There, while pursuing these researches in the autumn of 1911, by the light of a candle, the writer, perched on a rickety ladder, read the following, on the half-round closing stone:



Fig. 15. The last portrait of Robert Liston, taken about the beginning of 1847.

"SACRED TO THE MEMORY

OF ROBERT LISTON, F.R.C.S.

LATE PROFESSOR OF CLINICAL SURGERY

IN UNIVERSITY COLLEGE HOSPITAL

MEMBER OF THE COUNCIL OF EXAMINERS OF THE

ROYAL COLLEGE OF SURGEONS OF ENGLAND

BORN OCTOBER 28, 1794 DIED DECEMBER 7, 1847.

Of him it may truly be said:

"Ante diem perit; sed non sine gloria."

*℞ Turb. Arnicæ
Mentana 3ij
Aqua 3xix
℞ of Lotio
Mentana 3xix
Jan 7 1846 R. M. Liston
Indubio*

Fig. 16. A reproduction of one of Liston's original prescriptions.

BIBLIOGRAPHY.

1. Notes on the case of Frederick Churchill in Professor Liston's Case Book, taken by the Dresser, Edward Palmer, until almost the conclusion, and finished by Edward Franklyn, his successor.
2. *Pharmaceutical Journal and Transactions*, vol. vi, pp. 337-8 and 350-352. Here the curious mistake of Ransome, the house-surgeon, was made, he giving the date as Friday, December 18, instead of Monday, December 21.
3. The *Lancet* for 1847, vol. i, p. 5 *et seq.*, also vol. ii, 1888, pp. 1220-21. Dr. Wm. Squire's Account.
4. *British Medical Journal*, October 17, 1896, Account of Jubilee of Anesthesia, also for July 4, 1903, Obituary Notice of William Cadge, F.R.C.S.
5. "Anesthesia, Antient and Modern," a pamphlet published by Burroughs Wellcome & Co.; also much assistance from Mr. C. J. S. Thompson, now Curator of the Wellcome Historical Medical Museum.
6. "Anesthetics," by Dr. W. Dudley Buxton, the various editions.
7. Papers and scrap-books kindly lent me by Colonel Liston, then eldest son of Robert Liston, now deceased; and his wife, to whom I am greatly indebted for *Anecdota Listoniensia*.
8. A paper read before the Medical Society of University College Hospital by Raymond Johnson, F.R.C.S., the perusal of which prompted my researches and the publication of this sketch. Mr. Johnson quite agrees with the observation I made to him that working at the material of Liston's life makes one feel the same enthusiasm for him which was shown by his students and friends. He was every inch a man, and always to the fore in everything that was of service to the advancement of his profession.
9. Letters from Dr. Buckell, of Brighton, who was an actual witness of the operation, and who, like Dr. Duncan, of Harrow, another living witness, speaks in the highest terms of Liston's influence and skill.
10. *Tradition*.—(a) This I received in my youth from my father, the late Frederick Cook, M.D., and my uncle, the late Henry Maund, M.D., both old students of the University College Hospital. On one occasion in particular, I remember these two and several other old friends and fellow-students, including Dr. William Squire, meeting at my father's house. Among other reminiscences, the first operation under ether was described at considerable length, each man taking part in it. This made a great impression on me, and it is from the recollection of this talk that I drew this account, modifying it only from the authorities already quoted. (b) Received from Mr. Peter W. Squire, who told me what his father had repeatedly narrated to him. (c) A communication from Dr. Barton, of Kensington, giving the Sheldrake incident, which had been told him by his father, who was present on the occasion.
11. Essays and Addresses of the late Sir J. Russell Reynolds, 1896.
12. "Companion to the British Pharmacopoeia," Squire's, various editions.
13. *Transactions of the Medico-Chirurgical Society*, 1847-48.
14. R. S. Surtees' "Hawbuck Grange," late edition. This book has a preface dated October, 1847. On pp. 176-77, Tom Powles observes: "I see the Sessions are coming on and they are advertising for people to send instructions for indicting prisoners. I wish some one would send instructions for indicting the weather. Talk about ether, for cutting folk's heads off them when they're asleep without hurting of them. I wish they'd etherise me and let me sleep during a frost." Surtees was, of course, the author of the immortal *Jorrocks*, and the above is perhaps the first reference to ether anesthesia in general literature.

19 RANDOLPH ROAD, MAIDA HILL, W.

THE USE OF MUSIC IN LOCAL AND GENERAL ANESTHESIA.*

W. P. BURDICK, M.D.,

KANE, PA.

A brief letter which appeared in the correspondence column of the *Journal of the American Medical Association*, issue of June 6th, 1914, and signed by Dr. Evan O'Neil Kane, of Kane, Pa., was productive of rather interesting results. The letter referred to the use of a phonograph in operating rooms; and the new idea was so opposed to the fixed ideas on the subject of operative procedure that paragraph writers, and some doctors, used it as a safety valve for their pent up wit. Their attitude demonstrated once more the fact that the introduction of any new thing is sure to arouse the skeptic from the lethargy that sometimes overtakes him.

The suggestions which were made by the humorists as to the musical selections which would please them most, and be best adapted to the case when about to go *under the knife*, brought out an important principle which it is absolutely necessary to make use of in the successful adoption of music as a means of mitigating the dread of operations. If Mankind were always consistent, the idea of suitable music as an accompaniment to surgical clinics would seem entirely rational.

Theology teaches that the person who lives up to the principles of Christianity in this life passes, at death, to a higher, nobler and far happier existence; and yet, as practically all concede that *no traveler* has yet returned to verify these statements, even the most faithful Christian may be excused if at times there is a slight wavering of faith when facing dissolution; and an expressed willingness to bear, for awhile longer, at least, the ills they have.

But modern surgery offers to suffering humanity not only hope, but statistics. Few, indeed, are they who do not know that the skilled surgeon of to-day is able to eliminate most of the very worst afflictions that affect the human race; and that in the great majority of cases those who submit to surgical interference are restored to health, and a life of usefulness.

Assuming that the patient is free from mental bias, and is capable of taking a common-sense view of the situation, the fact that he or she is about to be relieved in one brief hour of some abnormal growth or condition that time and medicine could not cure, and which has caused years of suffering and abject misery—this fact should cause great re-

joicing. Instead, however, the patient is usually bidden a tearful farewell by the family and friends, and enters the operating room atmosphere often with such feelings of horror and dread as to be on the verge of collapse.

By *operating room atmosphere* I mean the demeanor and low professional tones of the surgical staff, the expressionless faces and whispers of the nurses, or an almost complete silence that is quite often harshly jarred by the rattle and banging of instruments. Realizing that these things are wrong in practice as well as in theory, we have, at the Kane Hospital, been endeavoring in some manner to break away from them, and surround the patients with more natural conditions—the more effectually to reassure them, and dispel their fears.

The installation, then, of a phonograph accompaniment to our operative work in the operating room was not a mere erratic experiment. It was suggested as a result of experience with appeals to the musical sense among individuals elsewhere. For some time a phonograph had been employed in the wards of the hospital as a pastime for the sick. It was operated by those who were able to be up out of bed for the diversion of the less fortunate. These, with but few exceptions, took great delight in it. It was observed that even the most serious cases did better while the phonograph was in operation, although it was kept going continuously from early morning until after nightfall.

Though it had been objected that the instrument would interfere with sleep, this was not the case. Quite the reverse. Even recently operated cases, from the time of entrance into the wards, and while still coming out of the anesthetic, would be beneficially influenced. Fully 95 per cent. of all patients expressed a desire to hear the phonograph, and of the remaining 5 per cent. not more than about 2 per cent. made any serious objection.

The striking facts above mentioned pertaining to the salutary influence of this instrument suggested to Dr. Kane and myself the idea of utilizing music as a diversionary means during operation under local analgesia. A phonograph was installed in the operating room, and pieces, instrumental and vocal, suited to the taste and temperament of individual cases, were selected.

My present method is to visit the patient on the evening before the morning of the operation, and in a little *heart to heart* talk I try to impress the fact that what is to be gone through with in the morning is by no means to be considered a trying ordeal. They will not suffer or be made uncomfortable in any way, but, in all probability, will be relieved of

* Read during the Organization Meeting of the Inter-State Association of Anesthetists, in Cincinnati, May 4-5, 1915.

their affliction. I state that so far as considering the operation a grave affair (and by grave, in this case, I mean the opposite of gay), we look upon it with such cheerfulness that we frequently have a little music while operating. I learn the patient's nationality, and the degree of fondness for music; and when the subject is brought into the operating room to be placed upon the table, the machine—*muffled*—is playing in subdued tones some piece the patient had previously expressed a liking for.

There never has been any feeling of hilarity, for I think we all feel as did Jessica in *The Merchant of Venice* when she said: "*I am never merry when I hear sweet music.*" We soon adapted ourselves to the innovation, and had no feeling that it was out of harmony with, and unsuited to, the occasion.

The effect has been highly satisfactory. In practically all cases the patients were attracted by the songs and instrumental music, and were diverted from the operation from start to completion. It was no longer necessary to keep myself or assistant engaged in conversation with the patients to divert them. They had enough to occupy them. At points in the operation when the surgeon had to block a nerve, drag upon a viscus, or explore a peritoneum beyond the obtunded area, a sign from him was sufficient, and the attention of the subject was called to some tone, strain, musical theme or turning in the concert. Thus, without breaking the harmony of the operating room technique, the good offices of the *great god Pan* were invoked and gratefully accepted.

Next, as was suggested, from the pleasure the ward phonograph gave patients being prepared for operation, that the instrument be set in motion as the patients were being brought into the operating room to be put under general anesthesia, in order to antagonize the feeling of fear and horror so common during this distressing phase of the operative ordeal.

About this time, also, my attention was attracted by the remark of a female patient while *going under gas*. Our operating room is situated in the top of the building—four stories above the noise, dust and odors of the street. On the first floor is a large parlor; and on this occasion the soft strains of a piano floated up through the corridors from this room, and faintly penetrated the operating room. After two or three spasmodic whiffs of gas the patient said, in tones of extreme satisfaction: "*Oh! I hear a piano. How sweet, and far away it sounds;*" and immediately I observed that the tension was gone; the breathing at once became regular, and the patient quietly, and rapidly went to sleep.

We then placed the instrument just outside the room for general anesthesia, with the tones always muffled, and it served the purpose well; for we observed that the anesthetic was almost invariably taken more calmly, and with less tendency to resist the earlier inhalations than formerly. Also, and this was of no small importance, if the action of the machine was resumed for a few minutes as the patients were recovering consciousness, they were thereafter deluded into a dreamy idea that they had heard the strains of music from start to finish, without break in their connection; and consequently, had escaped all operative interference, the cure effected having been as it were extraneous to any operative procedure; "*lifted to Heaven,*" "*translated,*" *borne to spirit land,*" "*to limbo,*" and other and similar expressions being frequently used.

Not all patients could, as has already been suggested, be treated with the same instrumental, or vocal themes. Temperament, education, religious training, and other psychic influences, as well as racial tendencies, have all had to be considered in making a real live success of this novel procedure. Otherwise it would be worse than a failure. The instrument, too, must be no *hand-me-down*, but one of the best; and only high-class music may be employed.

A few who are not benefited by the *song-world trance*, as Dr. Kane (desiring to keep pace with modern nomenclature) aptly puts it, make known their indifference to its charms so promptly, and with such emphasis, that there is no difficulty in discovering their deficiency in this respect, and the concert is brought immediately to a close, without further parley, and no injury is done.

Finally, all good doctors are lovers of art, and good music appeals to their refined natures. It therefore acts as a soothing medium for the operating staff during a long, harrassing operation; and by lessening nerve strain and anxiety, conduces to better work—thus scoring another gain for the patient.

406 CHASE STREET.

FEATURES IN THE OCTOBER ISSUE

INTRATRACHEAL ANESTHESIA

(Illustrated)

B. MERRILL RICKETTS, M.D., F.A.C.S.
Cincinnati, Ohio

ANESTHESIA FOR BRAIN SURGERY

(Illustrated)

CHARLES K. TETER, D.D.S.,
Cleveland, Ohio

NITROUS OXID IN OBSTETRICS.*

A CONSIDERATION OF THE TECHNIC OF APPLICATION

ARTHUR E. GUEDEL, M.D.,

INDIANAPOLIS, IND.

In previous reports on this subject I have felt that it was necessary to spend considerable time in comparing nitrous oxid with ether and chloroform in order to emphasize the advantages of this gas in obstetrics.

I am assuming, however, in this report, that my readers are men quite alive in anesthesia, and inasmuch as I have discussed this question in previously published reports, and it has recently been excellently considered in publications by Drs. Lynch and Webster, of Chicago, and Dr. Allen, of Brooklyn, and others, there is no need to dwell upon it here.

The application of nitrous oxid in labor has advanced to the point where it has become the general anesthetic agent of choice. I shall proceed immediately to a brief consideration of the technic of application.

As a result of experience with various methods I have formulated the following classification from which to choose:

1. *Analgesia; individual pain application; the patient holding the inhaler.*
2. *Analgesia; individual pain application; an attendant holding the inhaler.*
3. *Analgesia; continuous application; the patient holding the inhaler.*
4. *Analgesia; continuous application; an attendant holding the inhaler.*
5. *Anesthesia (light but complete narcosis); individual pain application; the patient holding the inhaler.*
6. *Anesthesia; individual pain application; an attendant holding the inhaler.*
7. *Anesthesia; continuous application.*

Before considering these methods separately there are two general questions to be discussed covering them all:

(1) Is pure oxygen necessary as a diluent to nitrous oxid? There is no manifest difference between gas oxygen analgesia and analgesia secured with gas and atmospheric air. The character of analgesia and its depth, depend upon the anesthetic agent. Oxygen, of course, is necessary but the quantity of this gas available from atmospheric air is sufficient to support proper oxidation of the body tissues in analgesia during any period of time.

As for individual pain narcosis the period of anesthesia here is so short that there is no need for the application of pure oxygen. In the last named classification: *Continuous Anesthesia*, oxygen, of course, has a decided advantage over air as a diluent, but as continuous anesthesia for any period of time is rarely needed in obstetrics, I have discarded the oxygen cylinder from my outfit and am depending entirely upon gas and air. To use pure oxygen is to complicate the apparatus and the technic of manipulation. Also air is always available at a very low cost.

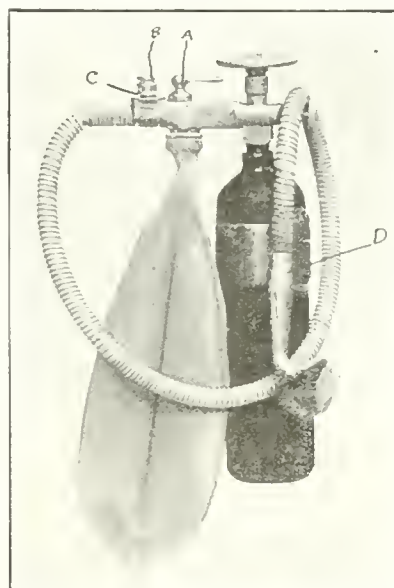


Fig. 1. The author's simplified apparatus for the self-administration of obstetrical analgesia. (A) Stopcock to control the flow of gas from the supply bag to the inhaler; (B) Expiratory valve to regulate the quantity of the gas mixture rebreathed; (C) Valve to regulate the quantity of air mixed with the gas; (D) Hollow aluminum handle by which the patient holds the inhaler. NOTE: All valves are back of the inhaler. By this arrangement the operator can make any adjustment desired without the patient's knowledge of the change.

(2) Why the self administration method? I am using this method because in most cases it is entirely efficient. Its various advantages I have discussed at length in previous published reports, but a brief review here will do no harm.

This method is absolutely safe. It is difficult to conceive the possibility of accident with the patient holding the inhaler. It renders unnecessary the calling of an anesthetist for every normal labor. It is only in the technical or more difficult obstetrical operations that I have found it necessary to call an anesthetist. Ordinary low forceps delivery, perineal repair, and such usual operations are accomplished as a rule without any inconvenience. Occasionally a patient is found who will not hold the inhaler properly, in which case, an anesthetist is called. Patients have no fear of this method. Also

* Read during the Organization Meeting of the Inter-State Association of Anesthetists, in Cincinnati, May 4-5, 1915.



Fig. 2. The Self-administration of obstetrical nitrous acid analgesia in use.

it gives the patient something to do. This last is of great advantage in actual practice.

Any one about the bed keeps the gas bag filled. With the approach of each pain the patient places the inhaler to her nose and breathes deeply the mixture of gas and air, dependent upon the state of analgesia or anesthesia desired. In short complete narcosis pure gas is admitted. In analgesia the gas is mixed with from twenty to fifty per cent. air or more. The patient will maintain in this way continuous analgesia. If narcosis supervenes the inhaler is usually dropped quietly an inch or two away from the nose and recovery, requiring from ten to thirty seconds, immediately occurs.

Now to take up individually the various methods under the above classification: 1. *Analgesia; individual pain application; the patient holding the inhaler.* The apparatus is adjusted to deliver the mixture of gas and air desired, the amount of air to be determined individually for each case. The gas bag is kept filled and as the patient places the inhaler to the nose, indicating the approach of a pain, gas is released from the bag through to the inhaler. The patient breathes until analgesia is sufficient to render the pain bearable and as the pain passes she is directed to remove the inhaler. Not infrequently a patient is found who refuses to remove the inhaler when told to do so, for fear that

the next pain will catch her unprepared, in which case, unknown to the patient, the gas is turned off and air substituted. Economy must not be forgotten. This is the method of first choice and in most cases it is entirely satisfactory.

2. *Analgesia; individual pain application; an attendant holding the inhaler.* The apparatus is regulated to deliver the desired mixture and in the absence of an anesthetist, the nurse holds the inhaler subject to the operator's directions. As the patient shows evidence of approaching pain the inhaler is placed over her nose and she is instructed to breathe deeply four or five times, after which her respirations settle to slightly above normal. It is not difficult to determine the passing of the pain, at which time the inhaler is removed.

3. *Analgesia; continuous application; the patient holding the inhaler.* It is advisable toward the end of labor when the pains are seemingly piling one upon the other, to permit a state of continuous analgesia. I insist that the patient hold the inhaler until she has proven her inability to do so. This occurs at times with nervous individuals, and in these cases the inhaler as well as the patient must be held by the attendant. The only advantage of intermittent analgesia over continuous analgesia is that it requires less gas.

4. *Analgesia; continuous application; an attend-*

ant holding the inhaler: This applies only in cases which cannot be controlled by the self-administration method. The inhaler is placed, and a mixture of gas sufficient to produce analgesia, with air sufficient to maintain a normal color, is admitted. Hysterical patients do not themselves hold the inhaler satisfactorily.

5. *Anesthesia (light but complete narcosis); individual pain application; the patient holding the inhaler:* In certain cases analgesia will be found not sufficient to control the pain, and anesthesia is permitted. This anesthesia is brought about in the following manner: Pure gas or gas with from five to ten per cent. air is delivered to the patient. She is instructed to hold the inhaler to her nose and coached to hold it there as long as possible. The inhaler is removed either by simple muscular relaxation with the onset of light anesthesia or by the first jactitory spasm. In some patients this jactitory spasm occurs with the first change in color. In others it is preceded by considerable duskiness. Little attention is paid to slight duskiness. However, where the discoloration is too apparent, although it is quite evanescent, I increase the air, in order to allay the anxiety of relatives at the bedside. Particularly in the earlier cases, dispensary cases, on which this gas was first tried out, the mother would repeatedly during labor be rendered quite cyanotic with frequent anoxemic muscular spasm. Very soon, however, this was found to be unnecessary, a lighter degree of anesthesia with no cyanosis and spasm being found quite sufficient to control the pain.

6. *Anesthesia; individual pain application; an attendant holding the inhaler:* This requires a good anesthetist with emphasis upon the word *good*. Anesthesia is induced slowly or rapidly dependent upon the character of the pains, the idea being to bring about complete anesthesia just in advance of the acme of uterine contraction. The inhaler can usually be removed at once and anesthesia will outlast the pain. I am in doubt as to whether this method should be placed sixth or seventh in our choice of methods.

7. *Anesthesia; continuous application:* I have in a number of cases successfully maintained continuous anesthesia in labor with gas and ordinary atmospheric air. This, however, is not to be recommended for general use and better results are obtained with gas and pure oxygen. However, continuous, complete narcosis is rarely required. When it is necessary, an anesthetist should be called. There is no difference between this anesthesia and that usually applied in general surgery, with the

exception that labor requires only a light degree of anesthesia.

The general technic varies with the individual case and the stage of labor being dealt with.

The time of administration depends entirely upon the degree of suffering. No unfavorable results have been noted even though the gas has been administered for periods up to six or seven hours. The average period of anesthesia necessary is from one to two hours. As the head passes over the perineum deep analgesia as a rule is sufficient. Anesthesia may be permitted. Delivery can be made slowly and deliberately. The head can be hung in the perineum until the vaginal orifice is completely dilated and ideal delivery between pains accomplished. During this period although analgesia is sufficiently deep to render the suffering negligible, yet the patient responds to suggestions from the obstetrician to *bear down* or *rest* as may be required.

I am not in position to compare the frequency of perineal laceration with nitrous oxid and ether, but I am quite sure that laceration is less frequent with nitrous oxid than with no anesthesia at all, this because the perineum may be manipulated at will. All perineal repair is usually done with the same method of anesthesia as was employed in that particular case.

In conclusion I wish merely to state that nitrous oxide is without doubt the best anesthetic agent for use in obstetrics that we have to-day. The technique may vary with the operation, but the one principle must hold in all cases, namely, that enough nitrous oxid be given to allay the suffering, with enough air or oxygen to maintain the respiratory balance of bodily tissues.

ABSTRACT OF DISCUSSION.

Dr. C. E. Turner, Columbus, O.: In discussing nitrous oxid analgesia in obstetrics, I must emphasize the fact that its merits can only be appreciated by those who have applied it to a number of scientific tests. While the rabid antagonists of nitrous oxid in surgery claim that you cannot get full relaxation from the administration of this anesthetic, this is just the feature that appeals to the obstetrician. The mechanism of labor demands the preservation of muscular tonicity in the abdominal muscles, to assist and increase the expelling force of the gravid uterus.

Gas-oxygen analgesia offers many advantages. (1) A uniform relaxation of the pelvic floor, with consequently fewer lacerations; (2) a shortened second stage of labor; (3) normal babies and placid mothers; (4) a rapid return of the patient to full possession of her faculties.

Gas-oxygen analgesia for labor is easily administered, though I have never practised the self-administration method of Dr. Guedel, always employing an expert anesthetist. The mixture of the gases must be adapted to individual cases. We have been able to produce analgesia with percentages as low as 50 per cent. gas and 20 per cent. oxygen; while others have required at high as 70 per cent. gas and 30 per cent. oxygen.

While analgesia is contraindicated in puerperal eclampsia, placenta previa and contracted pelvis, nitrous oxid-oxygen *anesthesia* is indicated for these complications.

The claim that babies born under gas-oxygen analgesia require pulmotor resuscitation, is not true. If oxygen perfilation is required, the oxygen is at hand for any emergency. As a routine, we preceed gas-oxygen analgesia with one ampoule of La Roche scopolamine; but do not repeat the dose. The gas is substituted for the morphia. In over 100 cases in the personal experience of Allen of Brooklyn. Skeel of Cleveland and myself, we have had no infant mortality and a clean record for the mothers.

In conclusion, if the analgesia is handled by an expert anesthetist, and the delivery by an experienced obstetrician, the method is ideal for not only routine labors, but also all possible obstetrical complications.

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FIFTEEN YEARS' EXPERIENCE WITH ETHYL CHLORIDE AS A GENERAL ANESTHETIC.

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Somewhat more than fifteen years ago I first essayed the use of ethyl chloride as a general anesthetic for operations of brief duration, and embodied my earliest experiences in several communications in 1901.^{1,2,3} Since that time I have had administered under my personal direction as many as 15,000 narcotics. By far the larger number of these have been in the ambulatory practice of the Surgical Service of the Good Samaritan Dispensary. Here, also, colleagues in other departments have repeatedly, after entering the service of this institution, followed my example in availing themselves of the facile and safe method of ethyl chloride anesthesia to the exclusion of nitrous oxid. So if numbers could carry conviction, I could rally authentic statistics, doubling those from my own personal experience. As both nitrous oxid and ethyl chloride were at our disposal, the choice of the latter was wholly voluntary and unbiased. The first fatality—yet to come—might have called forth censure from the Dispensary authorities, perhaps even a prohibition of its use; but should this ever impending incident now occur, we are well fortified against such an injunction by virtue of the large number of its successful administrations. I am emphasizing this point to disclaim for myself a death from ethyl chloride which has erroneously crept into the literature, because I had figured the mortality in 1903 at one in 15,000.

Those imbued with the slogan of the day, *safety first*, should consult the ethyl chloride mortality statistics in recent text-books on anesthesia. But more paramount than mere statistics, and what is more vital to the survival of ethyl chloride as a general anesthetic, is the criticism I propose of the assigned mortality. Not that its low mortality does not place ethyl chloride on a plane of safety

parallel with other anesthetics, but because a due appreciation of the capricious errors that have entered into a consideration of the subject will tend to place the estimate of its uses and safety still higher.

Thus the earliest reported death followed many hours after a kyphotic patient, a previous hemiplegic, had had a tooth extracted and walked home.⁴ The mortality from British sources, published by MacCardie⁵ and Luke,⁶ must alike be challenged as not at all relevant and certainly immaterial. The former says: "*I have seen neither asphyxia nor syncope in my personal experience of 2,000 cases,*" and then instances eight fatalities from other sources. Most of the deaths reported bear the hall marks of inexperience attaining ludicrous proportions, as for instance, the last case cited as follows:

Case 1: During the removal of adenoids and tonsils in a child, which necessitated tracheotomy, it is questionable whether ethyl chloride caused death. The surgeon thinks a piece of the growth fell into the larynx.

Equally incongruous is a death mentioned by Luke, in a child 12 months old, with diphtheritic obstruction of the larynx, when about to be tracheotomized! Perusal of the original of either author will reveal a number of such inconsequential deaths. In the same class I would put the much cited case in American literature:

Case 2: A colored man with strangulated hernia had vomited much preceding the anesthesia, which was started with ethyl chloride and progressed well. After three or four minutes ether was exhibited, followed by retching and continuous vomiting of an enormous quantity of clear fluid. In two or three minutes vomiting ceased; the patient became cyanotic, pulseless and died. No post mortem.

Lotheisen,⁸ who really fathered ethyl chloride for surgical anesthesia, thinks that the high mortality of the British is wrongly saddled on the anesthetic itself, for as early as 1903, antedating MacCardie, Lotheisen gave it as his opinion that only in one out of seven fatalities reported was ethyl chloride in any manner responsible for death. In support of his contention he cites two lamentable instances:

Case 3: A man, 59 years of age, anesthetized with 5 c.c. of ethyl chloride, followed by C. E. mixture, suddenly became pulseless and died. Post mortem examination revealed carcinoma of the prostate and metastases in the lungs.

Case 4: Death twenty-four hours after ethyl chloride anesthesia. Operation, gastro-enterostomy with resection of the pylorus.

In 1908 W. Estel Lee⁹ likewise comments on the varied difference of opinion as to fatalities under ethyl chloride anesthesia, and believes that there may be other elements present, independent of the anesthetic, which may be responsible for the mortality. Then Lee, mindful of these errors, contributes 4 deaths, all in negroes to whom ethyl

chloride was exhibited, and in each case the surgical condition per se was sufficiently desperate to account for the fatality. Lee attributes these deaths in negroes to the difficulty of recognizing imperiling cyanosis. In discussing this paper Dr. J. Gibbon¹⁰ says Dr. Lee has shown how superlatively statistics can deceive. Speaking for himself, Dr. Gibbon had used ethyl chloride anesthesia for short operations, during six years, with impunity. The one death reported in his thousands of cases occurred during an ether sequence in a case of Angina Ludovici complicated by endocarditis.

Case 5: In this case Schleich's infiltration was a failure owing to the depth of the exudate in the neck, and the painful manipulation necessitated a change to ethyl chloride-ether. Immediately following the evacuation of the pus behind the sternum, and a few minutes after discontinuation of the ether, the patient ceased breathing. Tracheotomy and artificial respiration were unavailing.

A. H. Miller, in 1908,¹¹ reported 6,648 cases of ethyl chloride anesthesia with a death occurring in the course of an appendicitis operation, for which he blames the inexperienced administrator. Furthermore, Miller collected 43,796 cases with five deaths, thereby computing an average mortality of 1 in 8,759.

In 1910 an arraignment of ethyl chloride anesthesia appeared from the pen of H. C. Wood,¹² under the title, "The Comparative Danger of Ethyl Chloride," which purported, by carrying the endorsement of the Committee on Anesthesia of the American Medical Association, to be more authoritative and less arbitrary. As a matter of fact it was neither. With Miller's figures as the point of departure, Wood endeavored to give a true actuarial interpretation of them in pointing out that 8 deaths were not credited to MacCardie, nor should they be, for these deaths had already been assigned to their original sources. To do so would have been repetition and would have constituted an actuarial error greater than the assumed juggling of figures by Miller. The balance of the strictures against ethyl chloride, which Wood himself characterizes as unduly harsh, are based merely on *profound conviction*, not born of actual trial and the implication that inexperience and untrained physicians and dentists are responsible for the fatalities. In all this there is manifested a lack of a due sense of proportion.

No one actually conversant with the use of ethyl chloride has condemned it nor damned it with faint praise. Shortcomings arising from the inexperience of the anesthetists should not be charged against the anesthetic agent. This is fundamental and obtains for the use of all lethal agents. Witness the following endorsements of those who speak from experience.

Dr. M. J. Seelig, wholly familiar with nitrous oxid, substituted ethyl chloride for it¹³ because it is practically as safe, induces quicker anesthesia, and causes no cyanosis or asphyctic symptoms. Gandiani¹² asserts that not one of the small number of deaths saddled on ethyl chloride was solely due to the agent itself.

In 1912 the *Medical Record* saw fit to single out for editorial comment, Malherbe's contribution,¹⁴ of 6,275 cases anesthetized with ethyl chloride without a death, wherein he expresses the belief that it will be used for long operations and that it will ultimately supersede chloroform and ether owing to its greater margin of safety.

Not a little of the antagonism against ethyl chloride springs from its improper administration. MacCardie says that the deaths from British sources outnumber those on the continent, because the closed method of administration is used by the former, the open by the latter. This is the crux of the matter. A proper use of ethyl chloride calls for the same principles in administration as those used in giving the more favored anesthetics. A free admixture of air is practiced in a large degree when giving chloroform and to a lesser extent in the administration of ether.

The use of inhalers with rubber-bag reservoirs confines the volatilized ethyl chloride, thereby reducing the quantity primarily used, always bearing in mind the free admixture of air in sufficient quantity, while to and fro breathing of the bag content, as with ether, favors a speedy and pleasant narcosis. When thus administered it is surprising how profoundly narcotized, completely anesthetized and thoroughly relaxed the subject becomes, after a brief preliminary and variable stage of excitement, more noticeable in neurotics and alcoholics. This safe and efficient narcosis may be continued at pleasure, and it is equally as astonishing to witness a recovery to complete consciousness within a few minutes, attended by such untoward complications as nausea and vomiting in exceptionally few instances, and seldom after proper preparation of the patient. The same degree of complete narcosis, attained with ether or chloroform, requires hours for recovery. With nitrous oxid pure or in combination with oxygen, no such relaxation is ever witnessed. The amount of ethyl chloride and the degree of anesthesia have to be gauged by the same criteria as any other narcosis and are too elemental to be described in detail.

In conclusion I would reiterate that I have endeavored to controvert the prejudice and bias against ethyl chloride based on a misconception of

its proper administration and assumed mortality. Some of the deaths recorded have occurred under anesthesia induced by a combination of ethyl chloride with other anesthetics such as ethyl bromide and methyl chloride. Personally I have restricted myself to the use of the purest obtainable ethyl chlorides, such as Ethesia and Kelene, and have never had occasion to regret their use.

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ANESTHESIA—A FULL-FLEDGED SPECIALTY.*

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The present age is essentially one of specialization in all things; and in no field of human activity and endeavor is this tendency more marked than in our own profession, and for the best of reasons. So rapid has been the advance of medicine in the past quarter century; so spectacularly have achievements followed discoveries in all the theory and science of that symptom-complex we call the *Practice of Medicine*, that any physician, however studious, who would acquire a comprehensive understanding, not to say practical working knowledge of medicine in all its branches, must perforce throw up his hands in despair. Thus specialization has come as the natural, logical and only feasible solution.

We have the surgeon, urologist, dermatologist, internist, pathologist, ophthalmologist and others;

even divisions and subdivisions of these. Why, then, should not the anesthetist, equipped and specially trained for his work, step up and take his place with the others, bringing to his specialty and demanding for it the same dignity and standing that is freely accorded theirs? The time is ripe for anesthesia to come into its predestined birth-right and for the anesthetist to be accorded the same status extended to his confreres in the older, established specialties.

While many among us can remember when anyone present was called upon to give the anesthetic and no skill or training in its administration was thought of, and previous experience was deemed unnecessary, yet no one can but approve the change that is in the making, and though recognizing that great strides have been made, we must still work for the further and fuller recognition of anesthesia as a full-fledged specialty, and the elimination of certain abuses that have crept into its practice.

Primarily the anesthetist should be a consultant, and it should be within his province, after examining the patient and familiarizing himself with the history of a given case, to decide on the preliminary preparation for as well as the anesthetic and method of its administration to be employed. In short, the duty of the expert anesthetist should be not only to administer the anesthetic safely and satisfactorily, but also to so prepare the patient for the operative ordeal and so manage the post-anesthetic recovery as to obviate any and all of the possible sequelae that not only endanger life, but make the postoperative recovery unpleasant. The conscientious anesthetist, who is an expert, is not only able but willing to assume this duty and its inherent responsibilities; but until it is conceded that he must answer up to these requirements and fulfill these obligations, his position will remain that of a subordinate on the operating staff.

The average surgeon knows little about anesthesia, and cares less. Only exceptional surgeons or specialists realize what team-work between operator and anesthetist can accomplish, not only for the patient's welfare, but their professional reputations as well. While some surgeons have a profound scientific knowledge of anesthesia, they can no more put themselves in the place of the practical and expert anesthetists, who by long experience has learned to sense certain things in connection with his daily work, than could the anesthetist replace the operator and intuitively master the surgeon's technic. Dictation as between surgeon and anesthetist regarding their respective technics is simply subversive of the patient's ulti-

*Read during the Organization Meeting of the Interstate Association of Anesthetists, in Cincinnati, May 4-5, 1915. (Chairman's address.)

mate chances of recovery; not that a thorough understanding of the anesthetic technic to the surgery involved is not a very desirable thing, and a decided element in promoting operative efficiency. While surgeon and anesthetist must each remain supreme in his own domain, their joint results will be gauged by the intimacy with which they co-operate their skill, judgment and sympathy.

The technical ability to skillfully administer anesthesia is by no means the greatest asset of the expert anesthetist; and the anesthetist of whom nothing more is required, whose judgment, ideas and opinions are not sought, becomes a mere automaton. Such routine drudgery, in this day of refinements in anesthesia, does not appeal to the type of man who has the makings of an expert and who should be encouraged to develop anesthesia into a full-fledged specialty.

The practice of permitting non-graduates to administer anesthesia is greatly to be deplored, and it should be one of the first efforts of recently organized associations of anesthetists to discourage and eliminate this evil. The mere moral effect of such associations, composed of reputable, licensed graduates, striving enthusiastically to further the science and practice of anesthesia and devoting their time and talent to establish anesthesia on the same plane as the older specialties, should go a long way toward eliminating the nurse anesthetist evil. However the letter of the law may be met by those hospitals and surgeons using trained nurses as anesthetists, by what technicalities the practice is made to seem legal, it is certain that the spirit and intent of all State Medical Practice Acts is violated. The question to be definitely answered is short and simple: *Is the administration of anesthesia and analgesia a part of the practice of medicine?* If so—and I think all will be forced to answer in the affirmative—then let us insist that henceforth anesthesia be administered only by duly graduated, licensed and, if possible, specially trained physicians. We need not hesitate to go on record as frankly and honestly opposed to the nurse anesthetist. However adept and skillful the nurse may become in the mechanical and automatic performance of her work—and it may be observed that the nurse is invariably used where a routine method of anesthesia is employed—she cannot, without the broad foundation of a general medical education, be equipped for the practice of this specialty as is the graduated, licensed, expert medical anesthetist.

The American College of Surgeons could do no finer thing for the advancement of surgery and anesthesia than to discountenance the non-graduate

anesthetist, as a violation of professional ethics. This evil affects the morale of the profession and its relations with the general public quite as much as the "fee-splitting" surgeon. The two practices are equally wrong in principle and both are demoralizing and their continuation is unworthy of the high ethical ideals that have always governed the conduct of our profession.

Other specialties have met with and surmounted similar obstacles during their transitional periods from obscurity to assured recognition. Undoubtedly the nurse anesthetist evil will be eliminated by degrees through the moral suasion of our associations of anesthetists. Such at least is "*the consummation devoutly to be wished.*" Regardless of the ethical problem involved, the employment of the nurse anesthetist is an economic affront to the skilled, expert medical anesthetist. Witness the efforts of the specialists in ophthalmology to restrain the refractionists in various states from securing the right to practice without graduation or license. The relation of the non-medical to the medical or dental anesthetist forms a parallel problem which may eventually demand the same drastic method of settlement.

An official interpretation of the Medical Practice Acts on this point would be welcomed by all right meaning, law abiding hospitals and surgeons, as well as the medical anesthetists of this country, for if the practice is illegal it should be abolished, and if countenanced by the state laws, immediate efforts should be instituted to have existing Medical Practice Acts so amended as to revoke the privilege.

Aside from the legality of the practice, the nurse anesthetist who has acquired a reputation for expert administration can make a better career for herself by studying medicine forthwith, and she can increase the dignity of her work, make it pay better and command the full respect of the whole profession. While drastic action may become necessary as a last resort, I believe personally that this problem is adjusting itself, and hence, for the present I would counsel patience, while we see what moral influence our associations of anesthetists can bring to bear on its solution. While a legal precedent would settle the question definitely, our specialty can afford to await the verdict of the profession and the public at large as it becomes educated to the value of our services as experts. Our contentions are bound to be recognized and our demands acceded to because they are right in principle and practice and tend to the conservation of the patient's best interests and welfare, and that in the final analysis is the main consideration.

The recent advances in anesthesia are many; the various refinements, improvements and perfections of technic are such that with proper experience, knowledge and equipment, almost any patient can be more safely, satisfactorily and more comfortably anesthetized than formerly, by any expert anesthetist familiar with his specialty.

The enterprising surgeon has more than enough to do to keep pace with the advances in his own specialty without attempting to familiarize himself with all that is new and advantageous in anesthesia and analgesia; nor can he be expected, in addition to the exigencies of the surgical procedure, to supervise the anesthetic phases of the operation, the preparation of the patient, the selection of the agent and the choice of technic, which may necessitate a change in the very midst of his work. Nor can his surgical judgment be at its best when of necessity he supervises both procedures—the operation and the administration of the anesthetic.

It is equally as unreasonable to expect anesthetic judgment, skill and efficiency of the newly graduated intern, who has had practically no instruction in anesthesia or analgesia while in college. The surgeon does not expect of the intern skill in x-ray work or pathology, for he relies on an expert Roentgenologist and pathologist for data upon which to base his diagnoses; and on their findings and their interpretation largely depends the decision of what surgery is possible, advisable and necessary in a given case. Why, then, have so few surgeons and hospitals expert anesthetists? Why jeopardize the best interests of the patient by anesthesia administered by nurses or interns, without the education, experience or training for the work, when this phase of the operative procedure, in the majority of instances, involves a greater risk of life than the surgical procedure itself?

If the administration of anesthesia were not looked upon as a trivial matter by the majority of surgeons and hospitals, and if the expert anesthetist were accorded the same recognition as a consultant as are the men in all other specialties, there would be no *anesthesia problem* for solution. The Report of the Anesthesia Committee of the American Medical Association (1912) handles this phase of the subject briefly and to the point.

"Every hospital, certainly every large hospital, should have as a regular member of its staff an attending anesthetist, whose authority in his special department should be as complete as is that of the attending physicians in theirs."

This is the solution of the anesthesia problem

as it affects hospitals. To the surgeon who finds this a perplexing question in his private work, there is no other ethical solution than the employment of an expert anesthetist, one in whose judgment and ability he has implicit confidence. By such an arrangement the surgeon makes good team-work possible, shifting to the anesthetist's shoulders all anxiety and worry as to the condition of the patient, leaving his own mind free to engage the exigencies of the surgical problems involved. Such team-work makes for better surgery, safer and more satisfactory anesthesia, and conserves the best interests of all patients operated on.

The ideal anesthetist is one who has properly trained and fitted himself for his specialty; who takes his work seriously and demands compensation commensurate with the skill required and the responsibilities assumed. That this type of anesthetist has arrived needs no better proof than our presence here to organize the Interstate Association of Anesthetists, to do which we are giving lavishly of our time and have come hundreds of miles. In organizing we believe that the occasional anesthetist as well as the tyro who "*gives a few anesthetics to help along while getting a start,*" are of the past and that the non-medical anesthetist soon will be. We believe in the dignity and importance of our work. We believe that anesthesia should be taught in all halls of medicine, and in the operating rooms of all hospitals, and that no one should attempt this work upon his own responsibility without previous instruction, theoretical and practical, as complete in this field as would be demanded of him in the fields of surgery or any other of its correlated specialties.

While this may sound utopian, and some one has said that "*Those who dream must live on dreams!*" still, those who dream long and hard enough usually make their dreams come true. Our work is three score years old, though our specialty is new. In this connection I submit that by far the greater number of improvements in technic, or newer methods of anesthesia and analgesia have been given to medicine and surgery by physicians and dentists working along these lines as specialists.

The same sentiment that incorporated the erstwhile London Society of Anesthetists as the Anesthetic Section of the Royal Society of Medicine is now leavening the medical profession in America, and once the public at large comes to an appreciation of the value of expert anesthesia, our work will be recognized as a full-fledged specialty.

STARKS BUILDING.

ETHYL CHLORID AS A GENERAL ANESTHETIC IN DENTAL SURGERY.

MAURICE GREEN, D.D.S.,
NEW YORK CITY.

Considering that nitrous oxid has been and still is the main anesthetic used by dental surgeons, it is not surprising that it is a very difficult matter to convince the profession that there is another anesthetic which, if properly administered, *equals* nitrous oxid in safety, and far *surpasses* it in many other respects. This claim I make for pure ethyl chlorid, which I have administered for the past 12 years, with the simplest of apparatus, in over 5,000 anesthetics, without any bad results whatever. Having perfected a safe, efficient and satisfactory method of administration, I entirely abandoned the use of nitrous oxid, and have never had any cause to regret doing so.

The criticisms and statistics advanced against ethyl chlorid anesthesia in current medical literature are usually the reports of casual observers, whose opinions are not entitled to a great amount of credence, and whose statistics are lacking in many essential details regarding the apparatus used, the amount of anesthetic administered and the previous condition of the patients. Moreover, the conclusions of competent anesthetists, medical and dental, controvert the alleged dangers of ethyl chlorid anesthesia by the preponderating evidence of thousands upon thousands of safe and uncomplicated narcoses.

Despite all efforts to advance the use of ethyl chlorid anesthesia, this method of narcosis has never been given the status it deserves in dental surgery. The surgical profession and many expert anesthetists, however, have found it an invaluable preliminary anesthetic for the induction of etherization and are using it extensively for that purpose and as an anesthetic of choice in minor operations, especially those requiring muscular relaxation.

While most dental operations are minor affairs, so far as risk of life is concerned, they are, nevertheless, exquisitely painful and most patients prefer to have them done under the beneficent influence of an anesthetic. Primarily, this anesthesia must be *safe; secondarily, efficient*. Likewise, a rapid induction and uncomplicated recovery are vital essentials. My personal experience has more than convinced me that ethyl chlorid anesthesia, properly administered, fulfills all these requirements.

Ethyl chlorid was used as early as 1848 as a gen-

eral anesthetic by Hayfelder. It is a clear, volatile fluid, highly explosive and should never be administered near an open flame. This precaution is of great importance, as several severe accidents are on record, in which patients were severely burned, following explosions of ethyl chlorid sprayed on the gums for analgesia, and ignited by the use of the electric cautery.

For general anesthesia the automatic tubes, containing from 30 to 100 grammes, with a heavy spray, are the most serviceable, particularly when graduated to control the amount of ethyl chlorid used. It is also essential to use the purest obtainable product.

A simple apparatus for the semi-open method of administration suffices. It is composed of the original rubber face-piece of the Ware inhaler, to which is attached a right-angled tube, ending in a rubber bag to hold the volatilized anesthetic and allow re-breathing. The ethyl chlorid is sprayed into the bag through a smaller tube, set obliquely into the angulated breathing tube. The administration is conducted as follows: Holding the inhaler in the left hand, it is carefully adjusted over the patient's mouth and nose to exclude the entrance of air around the edges. After several deep exhalations to inflate the rubber bag, the ethyl chlorid is gently sprayed into the oblique admission tube, the opening of which is then closed with the thumb for about six inhalations, after which the thumb is removed, and the spraying of the anesthetic repeated until the signs of anesthesia, relaxation, rhythmic or stertorous breathing supervene. Anesthesia of this depth suffices for extractions and other short operations. Anesthesia is deepened by the extent to which rebreathing is allowed, and air sufficient for all purposes of oxygenation is admitted by removing the thumb from the admission tube. For operations other than in the oral cavity, when the inhaler need not be removed, anesthesia may be continued for any length of time, as with chloroform or ether. For longer operations in the mouth, the nasal administration of ethyl chlorid with a DeFord inhaler must be used.

Induction of anesthesia is slowly accomplished, is not unpleasant, as ethyl chlorid has a sweetish odor, is not suffocating, and the transition to unconsciousness, in advantageous surroundings, usually occurs without any excitement stage.

While authorities differ somewhat on the physiological action of ethyl chlorid, the consensus of opinion now tends toward its being a cardiac stimulant. While the pulse diminishes in frequency under ethyl chlorid anesthesia, it becomes stronger

and as the anesthesia is continued there is a gradual return to a normal pulse rate. The higher centers are stimulated in most cases, a profuse perspiration frequently bathing the forehead. This militates in favor of the safety of the patient.

In routine administrations the pulse may be disregarded if a thin, flexible rebreathing bag is employed, and the rhythmical breathing of the patient is constantly observed. With a free air-way and no respiratory embarrassment, it is almost impossible to have any untoward complications.

During ethyl chlorid anesthesia cyanosis should never be present. If it occurs the anesthesia must be discontinued until its cause has been found and rectified. Probably the tongue has dropped back, or the pharynx is clogged with mucous and saliva. These untoward incidences are of unfrequent occurrence, and I can only recall one case personally in which anesthesia had to be discontinued to deal with impeded respiration. This was a surgical case in which it was desirable to avoid the use of chloroform or ether in a hazardous risk, and the anesthesia had to be prolonged. Such cases rarely occur in routine dental practice.

If ethyl chlorid anesthesia were complicated by post-anesthetic sequelae it could not be advantageously used in a busy office practice; and were its fatalities such as some authorities represent them, its use would be disastrous and have to be speedily abandoned, due to the publicity in the newspapers and medical journals.

In this connection, suffice it to say that 99 per cent. of my patients anesthetized with ethyl chlorid leave the office within ten minutes after the dental operation is over. While there is somewhat more nausea and vomiting after ethyl chlorid than following the use of nitrous oxid, I frankly admit it is of such infrequent occurrence and trifling severity that it should not overshadow the many other advantages of this method of anesthesia. Vomiting occurs in not more than 10 per cent. of cases, and its greater frequency is probably due to relaxation of the deglutary muscles, which under nitrous oxid are contracted, thus allowing the swallowing of blood and anesthetic impregnated mucous. This contention is borne out by DeFord, who in his "Lectures on Anesthesia" says: "Blood entering the stomach always causes nausea. The anesthetic should not be held responsible for nausea the result of swallowed blood."

Perhaps the greatest source of nausea and vomiting after dental anesthesia is due to the fact that patients coming for dental operations are seldom prepared in advance. The frequency of vomiting

noted after ethyl chlorid anesthesia in dental practice is not so noticeable when it is used in surgical operations for which patients have been properly prepared.

As to contraindications to ethyl chlorid anesthesia: Age is no drawback, although children, as with all other anesthetics, are the best subjects, alcoholics and neurotics the worst. Ethyl chlorid anesthesia is dangerous in pathological obstruction of the air passages, but not as dangerous as other anesthetics. The position of the patient under anesthesia can be at the operator's convenience, although a semi or horizontal position is best when practical.

From personal investigation and experience I am absolutely convinced of the safety of ethyl chlorid anesthesia. In 1911 I collected 20,000 anesthetics (Ware 10,000, Pick 5,000, Green 5,000) with but a single fatality; and since that time these same observers have added many thousand more cases to the list. The method has been equally as successful in the hands of many other observers who have lacked the time or inclination to report statistics.

In 1903 Tuttle expressed himself as follows regarding ethyl chlorid anesthesia, as combining all the ideals of a perfect anesthetic: "*Safety; insensibility to pain; complete relaxation; ease of induction; rapidity of effect; freedom from danger and after-effects, and simplicity of administration.*"

In 1904, A. F. Erdman said: "In a word, it is maintained that ethyl chlorid is a relatively safe general anesthetic exceedingly simple in its use, particularly pleasant to inhale, surprisingly rapid in both its action upon the body and its escape from it, and happily much less liable to unpleasant after-effects, which usually follow other anesthetics. The fact that over 30,000 successful anesthetics have been given should be enough to insure its favorable attention, and when one considers in addition all the operations for which it has been used, it is not surprising that some anesthetists do, and more surprising that some do not make use of ethyl chlorid."

DeFord in his "Lectures on General Anesthesia in Dentistry" (1908) says: "I consider ethyl chlorid in careful hands one of the safest of anesthetics. It, of course, has its limitations, and I think all fatalities reported have been due to carelessness, improper administration or attempting too prolonged an anesthesia."

Just previous to his retirement, Luke of Edinburgh reported that ethyl chlorid anesthesia had made enormous strides on the Continent, and was displacing nitrous oxid in minor operations and as a preliminary to general anesthetics.

As to the duration and scope of ethyl chlorid

anesthesia by the method described, I have personally maintained complete surgical narcosis with ethyl chlorid alone up to 1 hour and 15 minutes. The operative procedures have varied from dental extractions to abdominal sections and amputations. In all instances the anesthesia has been safe, efficient and satisfactory; the patient regaining consciousness very shortly after discontinuation of the anesthetic, with all after-effects reduced to a negligible minimum.

Compared with nitrous oxid, ethyl chlorid anesthesia requires a comparatively simpler and less expensive apparatus for its administration, and may be used with a paper cornucopia and some gauze or cotton in an emergency. Also with ethyl chlorid there is no imperiling cyanosis, no jactitation, no muscular contractions, no swelling of the tongue to obstruct the view or interfere with instrumentation. It is especially valuable in trismus from an impacted or unerupted molar, as under its influence the masseters relax and a gag may be inserted, whereas with nitrous oxid the muscular spasm is usually exaggerated.

Ethyl chlorid anesthesia is at least 50 per cent. cheaper than nitrous oxid anesthesia, which, under certain circumstances, is a vital consideration. It allows also a longer period of anesthesia, permitting a more deliberate operation. It is noiseless in its escape from the container.

Personally I consider the pure ethyl chlorid *safer, better, and less expensive* than substitute combinations marketed under various trade names. The added ingredients are a source of peril rather than a source of improved efficiency. The automatic, graduated tubes are also far less wasteful than the ampoules.

In conclusion I wish to say that *no* anesthetic is absolutely safe—merely relatively safe. The most essential factor in *safety first* is the skill and knowledge of the anesthetist, even with such anesthetics as nitrous oxid and ethyl chlorid. Statistics, unless overwhelmingly unfavorable, are of little value unless they represent the results of competent investigators, who have made a scientific and clinical study of the anesthetic agent and its method of administration.

The conclusions I have stated are the results of a personal use of ethyl chlorid anesthesia during 12 years' routine dental practice, with entire satisfaction and no fatalities or untoward complications.

27 EAST EIGHTY-FIRST STREET.

The ANESTHESIA SUPPLEMENT has recently been made the *Official Organ* of the NEW YORK SOCIETY and INTERSTATE ASSOCIATION OF ANESTHETISTS.

IN MEMORIAM.

Dr. D. C. McAllum, the first President of the Scottish Society of Anesthetists, died in Edinburgh, on February 26, 1915, at the early age of 51, after an operation for perforated duodenal ulcer.

The son of an Indian Army Surgeon, Dr. McAllum graduated in Edinburgh and after spending three years in general practice in the country, he settled permanently in Edinburgh and devoted himself exclusively to the specialty of anesthesia. For many years he held the posts of Anesthetist to the Royal Hospital for Children and to Chalmers Hospital. He was the only anesthetist attached to either institution, and year after year he fulfilled his duties there with great regularity, and was beloved of all his confreres and patients. In addition to his hospital work he conducted an extensive private anesthetic practice. His experience as a practical anesthetist was thus a very large one and it would probably be no exaggeration to say that his experience in the anesthetization of children was unique.

It may fairly be said of Dr. McAllum that he was inclined to be conservative in his methods. Recent developments in anesthesia with their more complicated and somewhat cumbersome apparatus did not appeal to him, and to the last, although he gave ether freely, he was to a large extent faithful to his first love, and was always ready to champion the claims of chloroform, in the safe administration of which he had acquired great skill.

He was University Lecturer on Anesthetics, and at the time of his death was engaged on an article on Chloroform for the new edition of the *Encyclopedia Medica*.

His loss, while deeply deplored by the Scottish Society of Anesthetists, is as much regretted by those who were his friends and loved him and by those who had experienced the beneficence of his skill and sympathy.

H. TORRANCE THOMSON, M.D.,
Associate Editor for Scotland.

Book Reviews

A carefully selected library is essential to a thorough knowledge of the science and practice of a specialty.

Anoci-Association. By GEORGE W. CRILE, M.D., Professor of Surgery, Western Reserve University, School of Medicine, Cleveland; and WILLIAM E. LOWER, M.D., Associate Professor of Genito-Urinary Surgery, Western Reserve University, School of Medicine, Cleveland. Octavo of 259 pages with original illustrations, many in color. W. B. SAUNDERS COMPANY, Philadelphia and London, 1914. Cloth, \$3.00, net.

The *First Edition* of Crile and Lower's *Anoci-Association* is already in its third printing, a rather remarkable record for a monograph; although its importance as a contribution to safety and comfort in operative procedures is sufficient explanation for not only the popularity of the book, but also the method. Tried out, as it has been, here and abroad, by progressive surgeons and expert anesthetists, it has received almost unanimous endorsement, and while some authorities may differ from Crile with regard to his enthusiasm over the *kinetic theory of shock*, nevertheless, even his critics use the principles of *anoci-association* in their operative procedures to the improvement of their statistics and the well-being of their patients.

This is evidenced in the current literature of the subject, and by the number of surgeons and anesthetists who are reporting their personal results with the method. Some enthusiasts, indeed, are crediting Crile with the greatest advance in anesthesia since its discovery. While this pendulum of approval will swing backward, it will only be to the position which will establish the permanent position of *anoci-association* in regard to surgical and anesthetic technic.

(Continued on page 121.)

American Journal of Surgery

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F. HOEFFER McMECHAN, A.M., M.D., Editor
Cincinnati, Ohio, U.S.A.

JULY

1915

EXPERT ANESTHETISTS AND ANALGESIA.

The results of any operation are materially enhanced for the surgeon and patient by general anesthesia administered by an expert anesthetist. Most up-to-date surgeons are already employing this expedient in their team-work, and those who do not are simply delaying their own progress.

While general anesthesia will undoubtedly remain a necessary accompaniment of routine surgery for all time to come, nevertheless analgesia is gradually coming into its own as the method of choice in certain selected operative procedures, or as a factor in anoci-association. The principal drawback to this method is the time consumed owing to the fact that the surgeon is accustomed to conduct his own analgesia. Now there is no reason why the expert anesthetist should not supervise the preparation of all analgesic solutions, and while the surgeon is washing up, infiltrate the operative field, and during consequent steps of the operative technic, inject the various tissues, pedicles and nerve requiring obtunding. By such team-work an almost incalculable amount of time can be saved and the surgeon is able to reserve his skill, judgment and strength for the operative technic, instead of being continually distracted by the details of the analgesia.

Certain dental anesthetists are already co-operating in this manner with oral surgeons by conducting analgesia for their operative procedures, with eminent satisfaction to all concerned.

In this connection a word to the wise should be

sufficient. There is no reason why the expert anesthetist should allow the conduct of analgesia to become a perquisite of the surgeon, when study, experience and proper persuasion will enable him to retain it as a vital part of his own specialty.—F. H. M.

THE AMERICAN COLLEGE OF SURGEONS AND UNLICENSED ANESTHETISTS.

The drastic attitude of the American College of Surgeons toward *fee-splitting* loses much of its force in view of the fact that the organization permits some of its most prominent members to continue the routine employment of unlicensed anesthetists.

If anything can be such the administration of an anesthetic is certainly a medical act, and as such should be duly limited to licensed practitioners of medicine and dentistry. Any other course of procedure is in direct violation of the letter and spirit of all *Medical Practice Acts*.

That a question of sex is not at the root of the antipathy toward the nurse-anesthetist is evidenced by the number of women physicians who are members of the various associations of anesthetists in this country and England. The nurse-anesthetist must go because she is unlicensed, and because her employment is as much an economic crime against the profession and public as *fee-splitting*.

It is up to the American College of Surgeons, during its forthcoming meeting in Frisco, to take action in this matter, or stand convicted of playing favorites, violating medical ethics and alienating a certain proportion of licensed practitioners from a legitimate source of financial support.—F. H. M.

NITROXID ANESTHESIA—A SUGGESTION.

In a personal communication to the EDITOR, Dr. W. P. Burdick, of Kane, Pa., suggests the use of the term *Nitroxid Anesthesia* to replace the rather cumbersome title of *Nitrous Oxid-Oxygen Anesthesia* for that important method of narcosis.

Some time ago, Dr. C. A. L. Reed suggested the term *Anocithesia* as a substitute for *Anoci-Association Anesthesia*, but the innovation was not accepted and we met with considerable criticism. Perhaps Dr. Rose could give us the correct terms for these procedures in irreproachable Greek derivatives, but even that would not insure their use.

For such hybrids to achieve popularity they must catch on, and in this hope the EDITOR presents these suggestions for popular approval and usage, knowing that this verdict alone will assure them a permanent position in medical nomenclature.—F. H. M.

Book Reviews

(Continued)

To the expert anesthetist the *kinetic theory of shock*, and its *histologic pathology*, will come as a logical sequence to the original researches of Ramon y Cajal on the cerebral changes under anesthesia, presented to the Eleventh International Congress of Medicine in Madrid. Cajal was inclined to attribute these cellular alterations entirely to the effects of anesthetic agents, but Crile's further researches have developed their relation to emotional, traumatic and sensory stimulation. The studies of Fischer, Hogan and Yandel Henderson on the causation of *acidosis* apparently promise to add additional importance to fear, hyperactivity and sensorial stimulation as factors in contributing to postoperative complications, not controlled by *anoci-association* methods. In this connection it is interesting to note that Crile concludes that nitrous oxid, of all anesthetic agents, especially in association with oxygen, induces fewer alterations in the central nervous system, and that consequently it is the safest anesthetic for hazardous risks, although one of the most difficult to administer properly.

In collaboration with Lower, Crile has adapted the methods of *anoci-association* to the operative technics now commonly in vogue, and this practical exposition of his theory, put to the test of clinical practice, is the more interesting part of the monograph to the surgeon and anesthetist.

Regarding preliminary alkaloidal medication, Crile's dictum that morphinization is always indicated unless *acidosis* already presents, should be remembered; as also the fact that opiates, in complicating *acidosis*, materially delay the postoperative alkalization of the blood, this condition being diagnosed and controlled by the H-ion contents of the blood.

Valuable suggestions are made regarding the proper use of novocain and adrenalin and quinin and urea hydrochlorid, in proper solution strengths and for special tissues and sites of injection. Especial attention is drawn to the value of *anoci-association* in two stage operations, in abdominal and gynecological surgery, genito-urinary operations, and many other procedures, such as goitre and imperiling sepsis in which the hazard to the patient's life is extreme.

A contribution to the practical use of nitrous oxid-oxygen anesthesia, as a factor in *anoci-association*, is appended by Agatha Hodgins, as is also a description of the Lakeside Hospital plant for the manufacture of the anesthetic agent. The Anesthesia Department in this issue presents Dr. A. R. Warner's latest conclusions regarding this plant, with an illustration to depict some of its revolutionary devices for obtaining an absolutely pure product.

A thorough familiarity with the *kinetic theory of shock* and the methods of *anoci-association anesthesia and surgery* will breed a contempt for the crude manner in which the patient's safety and comfort were relegated to secondary consideration in the past.

Anemia and Resuscitation: An Experimental and Clinical Research. By GEORGE W. CRILE, M.D., F.A.C.S., Professor of Surgery, Western Reserve University, Medical College; Surgeon to Lakeside Hospital, Cleveland, Ohio. *First Edition.* Octavo, leather binding, 305 pages, 16 illustrations. D. APPLETON & COMPANY, London and New York, 1914.

This monograph of Crile's is based on studies of anemia as it affects the body as a whole or its component parts, made in an endeavor to solve certain practical clinical problems confronting the surgeon, anesthetist and internist.

Crile early establishes the fact that in resuscitation of the body as a whole, the greatest and most essential difficulty to be overcome is the anemia of the brain. In apparent death from drowning, gas poisoning, electric shock, operative manipulation and hemorrhage, the organ which most quickly succumbs beyond the power of reanimation

is the brain rather than the heart. The monograph is virtually a development of this thesis, supported by exhaustive laboratory experiments.

Since continued normal action of the heart and lungs is dependent on the activity of the brain, the presence or absence, as well as the degree and duration of anemia of the latter organ, decides the possibility of resuscitation, and is also the determining factor in the restoration of functional activity. Kuliabko's brilliant work in making the heart continue to beat after its removal from the body, supplemented by the work of Hill, Batelli, d'Halluin, and others abroad, and of Stewart and his associates in this country, paved the way to further study of the automaticity of action of that organ. Attempts to resuscitate the body as a whole by massage of the heart, artificial respiration, or by the injection of saline and other solutions into the circulation, were the natural sequence of their results. The experiments from the author's laboratory, presented in this monograph, are a continuation of those on surgical shock, in which it was shown for the first time that the blood-pressure of a decapitated dog could be maintained for hours by means of the slow, continuous infusion of normal saline solution and adrenalin. This again led naturally to the use of adrenalin-saline intravascular infusion combined with rhythmic pressure of the chest, as a means of resuscitation.

The studies of anemia of the central nervous system are of especial interest to the surgeon and anesthetist, as they offer a solution for hitherto unexplained catastrophes on the table and untoward sequelæ following apparently successful operations. The intimate relations existing between cerebral anemia, anesthetic fatalities, the difficulties of resuscitation and the incidence of the postoperative paralyses are explained in detail, and the author suggests many practical methods for combating these complications, notably, clamping of the larger arteries instead of ligation. These researches are a corollary to Wyeth's "Ligation of the Carotids," and are an invaluable contribution to *safety first* in extra hazardous surgical risks.

The field of local anemia, associated with embolism and thrombosis, too tight application of bandages and other apparatus, localized pressure from the weight of the body in unconscious patients, twisted pedicles of tumors and organs, too tight packing of wounds and incarceration and strangulation of the intestines, has been thoroughly canvassed, and from a wealth of experimental data and clinical results, proper prophylactic and restorative measures have been developed, and have stood the test of clinical practice and results. A mastery of these newer problems in local anemia is a prime requisite for the progressive surgeon who attempts the work of Carrel in transplanting organs, bones or tissues from one individual to another. Successful transplantation presupposes a thorough knowledge of the power of any given organ, bone, tissue or gland to resist anemia while the operation is being performed, and a definite technic for establishing a sufficient circulation to conserve the vitality of the transplant.

The author acknowledges his indebtedness to Drs. D. H. Dolley, Lawrence Pomeroy, A. M. Tweedie, H. G. Sloan and J. B. Austin, for their cooperation in the experimental phases of his work.

The monograph is so fascinatingly written that in the pleasure of reading it one is apt to overlook its fundamental scientific significance; but even a cursory perusal leaves the reader with the impression that he has acquired very vital information with no effort at all.

The Principles and Practice of Tooth Extractioe and Local Anesthesia of the Maxillæ. By WILLIAM J. LEDERER, D.D.S., Dental Consultant to the German Hospital, New York City. *First Edition*, pp. 262, illustrated with 120 textual figures and 8 figures on 4 plates. THE REBMAN COMPANY, New York, 1915. Price, \$3.00.

In offering this little volume the author does not presume to have fully exhausted his subjects, but has presented them in compend form to aid both the dental student and practitioner and to recall to their minds that tooth extraction is a surgical procedure and must be carried out accordingly. Thanks to the pioneer work of Braun and Fischer, painless dentistry under local or conductive anesthesia has become a reality, and Lederer is

enthusiastic in endorsing the latter technic for all intra-oral operations.

Appreciating the systemic complications arising from mouth infections, Lederer points out the true aspect of dental and oral operations, based on this conception of etiology and pathology. Regarding cleanliness and sterilization he advocates the same care and precautions as are exercised for an abdominal section. He believes in establishing cordial relations with patients, examining them thoroughly, particularly with the x-ray, and in properly preparing them for the operative ordeal, so that they will

Annals of Surgery—General Index. Volumes Fifty-one to Sixty, 1910-1914. Paper covers, pp. 88. ANNALS OF SURGERY, Philadelphia, 1915. Price, \$1.00.

This General Index of the last ten volumes of the "Annals of Surgery" is a very handy reference guide to the many original communications on the advances in anesthesia and analgesia during the past decade, aside from its almost exhaustive references to the surgical progress of the same period. Cross-references make this index an easy one in which to locate either the authority or subject desired.



Visiting lady guests of the Interstate Association of Anesthetists, photographed in front of the New Hotel Gibson, just before their auto trip to the Art Museum during the Organization Meeting in Cincinnati, May 4-5.

withstand it safely and with the least possible discomfort.

The indications for extraction are given in detail, and the minutiae of instrumentarium, drugs and dressing are thoroughly covered. Following a painstaking exposition of the technic of normal extractions, Lederer devotes considerable attention to root extractions and the methods of dealing with impacted and unerupted teeth. In handling these subjects Lederer emphasizes the value of scientific surgery, coupled with individual skill and cleverness. His chapters on post-extractive care and the treatment of complications are replete with valuable suggestions.

Part II of the volume is devoted to a detailed description of general, local, conductive and regional anesthesia, of which methods Lederer prefers the conductive. He describes the preparation of solutions, his armamentarium, the anatomical topography and injection technics, and also considers indications and contraindications to the respective methods.

Lederer fully appreciates that shock may readily occur during intraoral operations, and he gives judicious advice regarding the treatment of this complication. He appends his own records regarding results under the use of conductive anesthesia, in proof that he is not overly enthusiastic. He also appends chapters on poisons and their antidotes, the treatment of emergencies, and formulae and useful prescriptions.

While the binding, typography and printing of this volume are in the usual good style of the Reiman press, it is to be hoped that in succeeding editions larger and more illuminating illustrations will be secured.

Society Proceedings.

Membership in a society devoted to your specialty is an essential to success.

THE INTERSTATE ASSOCIATION OF ANESTHETISTS.

The Organization Meeting of the Interstate Association of Anesthetists, held in Cincinnati, May 4-5, 1915, was a decided success in every sense of the word. There was a large attendance of anesthetists, interested surgeons and research workers, and the association was launched with a charter membership of eighty-six, from points as distant as New York, Atlanta, San Francisco and Montreal. While the limitation of membership is unrestricted, the association decided to limit its place of meeting to the following states: West Virginia, Ohio, Kentucky, Tennessee, Indiana, Illinois and Michigan, in order not to conflict with the activities of other anesthetic organizations.

The Program of the Scientific Sessions, as printed in the April issue, was carried out with the absence of only one essayist. As the Transactions will be published in full in the Anesthesia Department there is no occasion to enter into a detailed account of them now.

One hundred members in attendance and their lady guests participated in the Organization Dinner. The menu was excellent and Victrola music and selections by the

Gibson Hotel Orchestra enlivened the intervals between courses. Dr. W. D. Haines proved himself, as usual, an altogether charming toastmaster, and after felicitating the association on its organization, introduced the various speakers of the evening. Dr. Louis Ransohoff travestied the "Anestheasiest Way" in a droll manner, and suggested many amusing possibilities for phonographic music as an accompaniment of operative procedures under local analgesia, among which not the least amusing was the contretemps of having the Victrola nurse, after a successful Cesarean section, grind out the popular hit: "Can't You Take It Back and Change It for a Boy?" Dr. Otto Juettner, the medical historian of the Ohio Valley, gave a new interpretation of the first operation under any anesthetic, and proved to his own satisfaction that it was not a *rib-resection*, but a *complete laminectomy*, as everyone was fully aware of the fact that since its occurrence in the Garden of Eden man has never had any backbone left. This was by way of paying his respects to the "Woman—the Eternal Narcotic." Dr. W. Hamilton Long's address on "Anesthesia—a Full-fledged Specialty," was enthusiastically received. It is printed in full in this issue.

Dr. E. S. McKee, raconteur and globe-trotter, related many "Anesthetic Anecdotes," of which an interesting one was the description of an operation for multiple fibroids, performed by that remarkable pioneer in gynecology, the late lamented Dr. Thad Reamy, assisted by the genial Dr. Bonefield. It was done on the wife of a colored parson in Covington, Ky., and was begun at three in the afternoon, but not completed until half after nine that night. The anesthetic was administered by Dr. Robert Carothers, who welcomed the association to Cincinnati, on behalf of the local profession, and as second assistant it was the duty of Dr. C. A. L. Reed, erstwhile President of the American Medical Association, to provide light for the operative procedure after dusk had fallen. This he did by standing on a rickety kitchen chair, holding an old oil lamp in one hand, and reflecting its rays into the abdominal cavity by means of a cracked hand-mirror held in the other. Truly a picture worthy of the brush of some renowned historical painter.

Dr. F. G. DuBose, although not on the banquet program, at the earnest solicitation of the toastmaster, told some of his dialect stories in his own inimitable way, notably the obstetrical incident of the old colored mammy, who, after trying all her African necromancy on a primipara without avail, attempted to "*smoke the derned thing out!*"

Mrs. W. A. Teveluwe's toast on "Man—the Counter Irritant," was a pleasant innovation and a compliment to the rampant feminism in the new association. Your correspondent cannot resist the temptation of quoting her concluding remarks by way of congratulation to the association, its purpose and achievement:

"An old man going a lone highway
Came at the evening, cold and gray,
To a chasm vast and deep and wide.
The old man crossed in the twilight dim,
The sullen stream had no fear for him,
But he turned, when safe on the other side,
And built a bridge to span the tide.

"Old man," said a fellow pilgrim near,
"You're wasting your strength in building here;
Your journey will end with the passing day;
You never again will pass this way;
You've crossed the chasm deep and wide,
Why build you this bridge at eventide?"

The builder lifted his old grey head—
"Good friend, in the path I've come," he said;
"There followeth after me today
A youth, whose feet must pass this way.
This chasm that has been but as naught to me,
To that fair-haired youth may a pitfall be;
And he must cross e'er the twilight dim;
Good friend, I am building this bridge for him."

"You, who are gathered here as Charter Members of the Interstate Association of Anesthetists, are, as it were, the Builders of Bridges, upon which the specialists in anesthesia of a younger generation will cross, confident of the victory of life and science that lies before them. But you

will have the consolation of having made the way. Builders of Bridges, I envy and congratulate you."

The visiting lady guests of the association were royally entertained by Dr. Nora Crotty and the Local Committee of the Cincinnati Academy of Medicine. A tea and reception at the Woman's Club preceded the Organization Dinner, and after that they were taken to a theater party to witness the production of "Grumpy," which was thoroughly enjoyed. The next afternoon was devoted to an auto sight-seeing tour of Cincinnati, with a visit to the Art Museum and Rookwood Pottery. It is the intention of the Interstate Association of Anesthetists to so entertain all lady guests that it will be a temptation for every member to bring his wife, sister or sweetheart to all future meetings.

The following organization officers were re-elected: Chairman, Dr. W. Hamilton Long, Louisville, Ky.; Vice-Chairman, Dr. Isabella C. Herb, Chicago, Ill.; Secretary-Treasurer, Dr. F. H. McMechan, Cincinnati, O.; Executive Committee: Dr. A. E. Guedel, Indianapolis, Ind.; Dr. John Evans, Buffalo, N. Y.; Dr. W. P. Burdick, Kane, Pa.; Dr. W. I. Jones, Columbus, O.; Dr. Moses Salzer, Cincinnati, O.; Dr. W. N. Lynn, Knoxville, Tenn.

During the business session, after adopting the Constitution and By-Laws, the following resolutions, presented by Dr. Charles K. Teter, President of the American Association of Anesthetists, were unanimously endorsed:

"WHEREAS, The Industrial Commission of the State of Ohio, under the Workmen's Compensation Act, has established the anesthetist's fee at five dollars (\$5.00), irrespective of the inherent hazard of the case, the duration of anesthesia and the method of administration involved; and

"WHEREAS, It is generally recognized that in 80 per cent. of operative procedures anesthesia presents a greater immediate risk of life than the surgical procedure itself; and

"WHEREAS, Under present fee conditions the surgeon must use the cheapest method of anesthesia as well as employ the least experienced administrator he can secure, regardless of safety; and

"WHEREAS, This state of affairs practically prohibits the employment of expert anesthetists and certain methods of anesthesia, notably nitrous oxid-oxygen; and

"WHEREAS, Such expert service and such advanced methods of anesthesia would reduce the liability of the loss of life under operations to a minimum, therefore

"Be it Resolved, That the Interstate Association of Anesthetists in convention assembled do hereby urge the Industrial Commission of the State of Ohio to amend its ruling regarding the anesthetist's fee, so that in all cases involving an inherent hazard of life from the anesthetic itself or its prolonged administration, a minimum fee of ten dollars (\$10.00), and a maximum fee of twenty-five dollars (\$25.00), be established for the administration of ether and chloroform, and that a rate of twenty-five dollars (\$25.00) an hour or fraction thereof be established for the administration of nitrous oxid-oxygen anesthesia.

"Be it further Resolved, That fees covering services rendered by an assistant or anesthetist shall not be paid out of the Workmen's Compensation Fund, unless such services are rendered by a legally qualified medical or dental anesthetist, as determined by Section 1287 of the Ohio State Code; and

"Be it finally Resolved, That a copy of these Resolutions be submitted by the Secretary to the Ohio Industrial Commission for favorable action; and that they be published in the Official Organ of the Association and other journals of the medical and dental press."

On account of its activities in advancing the science and practice of anesthesia and analgesia and its efforts to improve the status of the anesthetist, the AMERICAN JOURNAL OF SURGERY was selected as the Official Organ of the Interstate Association of Anesthetists.

The decision regarding the time and place of the Second Annual Meeting was left to the discretion of the Executive Committee, with the understanding that the meeting would be held in conjunction with some other medical or dental association.

The Interstate Association of Anesthetists is deeply indebted to Dr. E. O. Smith, Chairman of the Local Committee on Arrangements for the Ohio State Medical Asso-

ciation Meeting, for his cooperation in promoting the joint session and for material assistance in defraying the organization expenses. Also the Hotel Gibson outdid itself in hospitality, and those present carried away very pleasant recollections of Mr. Hawk, who made the arrangements for the scientific sessions, and Mr. Oberley, who served the Organization Dinner. In this connection, it must not be overlooked that the Cincinnati Chamber of Commerce, through its Convention Manager, Mr. Dehoney, was conspicuous in its efforts to entertain the visiting ladies.

LOUISVILLE SOCIETY OF ANESTHETISTS.

For several years the desirability of establishing an organization in Louisville for the special discussion of anesthesia has been felt. Nothing definite was done until last winter, when the University of Louisville appointed a staff of nine specialists to supervise the administration of anesthesia at the new Municipal Hospital. Shortly after this, in March, Dr. W. H. Long invited these appointees to an informal meeting to discuss the possibility of organizing a local society of anesthetists. The following anesthetists met at the home of Dr. Long: Drs. H. S. Eggers, Jno. W. Heim, E. L. Henderson, D. Y. Keith, J. A. Kirk, E. O. Sage, T. K. Van Zandt and E. F. Horine. Plans were discussed and it was unanimously decided to permanently organize a local society.

A second meeting was held in April, with Dr. J. A. Kirk as the host. At this time a Constitution and By-Laws were adopted.

The first regular meeting was held on May 14, 1915, with Dr. E. L. Henderson as host. The following members were present: Drs. Eggers, Heim, Henderson, Keith, Kirk, Long, Van Zandt and Horine. The meeting was called to order by Dr. Jno. W. Heim, acting as chairman pro tempore. The following officers were then elected for the year 1915-16: President, Dr. W. H. Long; Vice-President, Dr. Jno. W. Heim; Secretary-Treasurer, Dr. E. F. Horine.

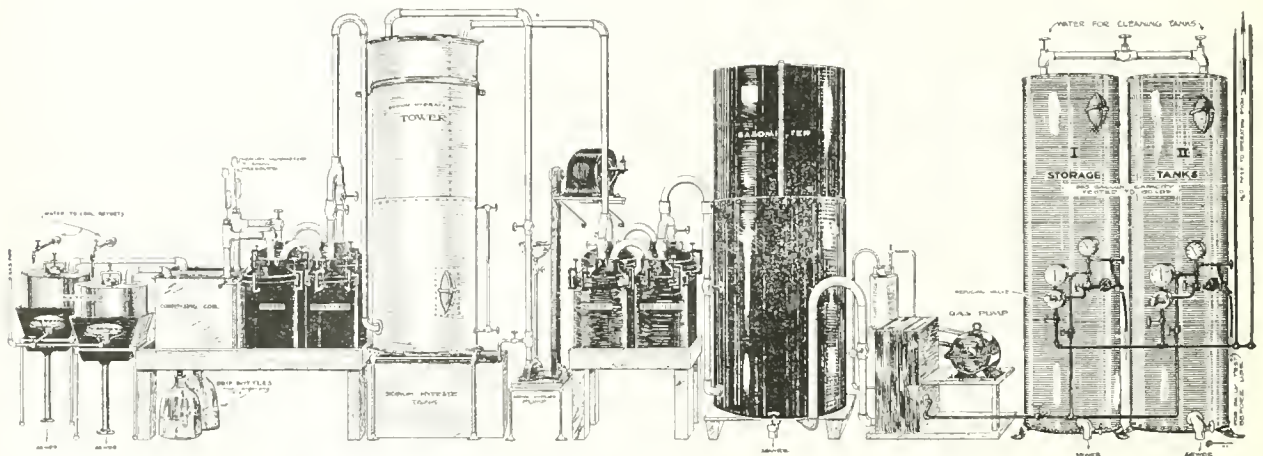
Interesting cases were reported by Drs. Kirk and Heim, and a general discussion followed.

The essay of the evening, "Anesthesia, Past and Present," was read by Dr. T. K. Van Zandt, and discussed by Drs. Long, Kirk and Heim.

The Society then adjourned to meet in September, after the vacation period.

E. F. HORINE, M.D., *Secretary.*

EDITOR'S NOTE: The AMERICAN JOURNAL OF SURGERY extends its congratulations and good wishes to the Louisville Society of Anesthetists, and predicts for it a long and useful career. In this connection the Anesthesia Supplement takes pleasure in announcing that it will carry an abstract of all the meetings of this Society.



Newer Apparatus

Editor's Note. From time to time this Department will publish Illustrations and Technical Details of the Newer Apparatus for Anesthesia and Analgesia.

THE MANUFACTURE OF NITROUS OXID FOR ANESTHESIA IN HOSPITALS.

A. R. WARNER, M.D.,

Superintendent of Lakeside Hospital, Cleveland, Ohio.

There are now evidences that the use of nitrous oxid-oxygen anesthesia will become more general than it has been, and we are hearing of other hospitals who are considering the installation of apparatus, as we have done at Lakeside, to manufacture the gas. It may therefore be timely and perhaps helpful to publish the story of its manufacture and use at Lakeside, in part as a warning against pitfalls and in part as evidence that success in manufacture can be attained.

At Lakeside Hospital nitrous oxid gas has been used for anesthesia extensively for about eight years and has been manufactured in the hospital as part of the routine

for more than five years; and for this length of time nitrous oxid-oxygen has been the anesthetic of choice. Our experience, therefore, has amounted to the use of approximately 500,000 gallons in about 2,700 operations yearly.

For the first four years our gas was not entirely satisfactory, and at times not without harmful effects. This was overlooked at first, partly because on the whole we had as good results as others, and partly because it was still believed that cyanosis was necessarily present during nitrous oxid-oxygen anesthesia. As our pioneer anesthetist, Miss Hodgins, developed more skill with this anesthetic she was able to demonstrate to us that the cyanosis, and the irritation and the symptoms of toxemia following anesthesia, were present to a greater or less extent in all or several patients on the same day, and on other days were completely absent; and she convinced us that the gas contained a variable amount of some poison. Commercial gas, although not without these effects, seemed more uniform, and distinctly less irritating. This difference seemed fairly constant, although our plant and methods of manufacture were the same as the commercial plants known to us. On our worst day one patient of the gynecological service died, with all the symptoms of a severe toxemia, a few hours after a simple operation; one patient of the surgical service was severely poisoned, and three others suffered to a lesser extent. The predominating symptom was a cyanosis that no

amount of oxygen could dispel. It seemed certain that the hemoglobin had been damaged, and our surgeons learned that out-of-door fresh-air treatment was most effective. The condition, with the exception of the color, resembled carbon monoxid poisoning, but unfortunately no spectroscopic examinations of the blood of these patients were made.

At last, about two years ago, it became evident to all that nitrous oxid must be obtained in greater purity or its use in the hospital abandoned. On the good days this anesthesia was so satisfactory and so easy for the patient that it seemed best to make every effort to make it right. The best consulting chemists obtainable were called to examine the plant and methods. Each pointed out possible defects and all agreed that better apparatus and methods could probably be developed by experiment. Each called attention to the great number of possible impurities. One of our trustees, Mr. H. M. Hanna, then offered to provide the funds necessary to run an experimental plant at the hospital, and the writer undertook to solve in such a plant two problems:

First—To find a method for the manufacture of nitrous oxid of sufficient purity to be without poisonous effect.

Second—To devise apparatus by which this can be done in a routine way in hospitals under hospital conditions.

The details of the many experiments with chemical processes and types of apparatus need not be presented. The net result of the first six months' work was merely that we obtained more uniform gas, and we did not have the very bad days. About this time we found that nitric oxid, even when present in large amounts, was entirely removed from the nitrous oxid by confinement in iron tanks over night. This explained the lesser irritation from commercial gas, which is always shipped in iron cylinders. Commercial gas had always been free from nitric oxid, while our gas, which was sometimes used without standing long in the tanks, had not been free from it. In these experiments we became convinced that the poisonous effects were, at times at least, not from the nitric oxid, which has been the generally dreaded impurity.

The impurities theoretically possible to produce in the destructive distillation of even a pure ammonium nitrate in an iron or other reducing retort are many; among them are free ammonia and many of the more highly organized, well-known hemoglobin poisons, such as the hydrazines, hydroxylamines, and others. It seemed possible that these were causing the trouble. Our gas and the best samples of commercial gas obtainable were found slightly alkaline to phenolphthalein. Published analysis of commercial nitrous oxid had reported the presence of ammonia and nitrogen. This certified to the presence of ammonia, or of substances breaking down to ammonia. A thorough washing with strong sulphuric acid was then added as another step in the process of purification. On this day—now over a year ago—our gas became absolutely neutral in reaction, and the peculiar cyanosis disappeared from our operating rooms, never again to appear when acid-washed gas was used. We have, however, seen it each time that the installation of new apparatus in the plant made it necessary for us to shut down and for a few days use commercial gas *not* scrubbed with acid.

As a further result of our experiments, it may be mentioned that our plant has been changed from the conventional commercial plant in the following essential particulars:

1. The use of a retort material less liable to attack by the vaporized ammonium nitrate. The iron retorts were corroded through in about six weeks. The best material yet found, having the required strength, is a 95 per cent. aluminum compound. (In this retort ammonium nitrate is heated, forming, theoretically, pure nitrous oxid and water, but, practically, a mixture of many nitrogenous compounds.)

2. The use of larger outlets for the retorts, fitted with packing joints connecting directly with larger caliber piping, thereby removing 60 per cent. of the back pressure and lowering the boiling temperature.

3. Discontinuation of the use of glass tubing entirely, because it was too easily broken.

4. The practice of cooling the gas immediately to about 10° C., to remove the water (45 per cent. by weight), and to catch and recombine the greater part of the dissociation products of the distillation.

5. Oxidation of nitric oxid to nitric acid, which is removed by the scrubbing with sodium hydrate (10 per cent. solution) which follows.

6. The scrubbing with sulphuric acid (20 per cent) mentioned above, which follows the scrubbing with sodium nitrate.

7. The insertion of mercury monometers after each process to act as a signal to indicate any obstruction, leak, or unusual condition, and to give (by comparison) enough evidence of rate of gas flow to be a satisfactory indicator for practical purposes.

8. We have also developed more satisfactory models for several parts of a plant of hospital size, some of which are along new lines.

Laboratory experiments by Dr. H. G. Haskins, Associate Professor of Organic Chemistry and Biochemistry in Western Reserve University Medical College, have confirmed the following points:

1. The advantage of non-corroding retorts, which reduce and disintegrate less of the ammonium nitrate.

2. The advantage of distillation under lower pressure and temperature, in that it causes less dissociation.

3. The effectiveness of the cooling of the gas to remove the water and to recombine promptly the dissociation products. This large bulk of water catches a large proportion of the impurities too much changed to recombine.

4. The importance of the scrubbing with sulphuric acid to remove the free ammonia and other alkaline substances (as hydrazines and hydroxylamines) possibly present. The only alkaline substance identified, however, was ammonium. Without the acid washing the gas would contain alkaline substances organic in nature.

The existence of the more highly organized and more poisonous alkaline impurities has not as yet been demonstrated in samples tested, and animal work to determine whether free ammonia itself when inhaled in anesthesia can produce the effects noted, has not been done. The use of gas from our plant for a year, absolutely without ill effects, has lessened local interest in troubles from impurities. It is in a way unfortunate that these troubles were ended so promptly by practical methods before they were scientifically investigated. We hope the practical result will some day be fully explained.

To our minds the first problem has been solved: nitrous oxid can be manufactured in sufficient purity to be absolutely safe for use in anesthesia. We are not quite sure about the second problem. Unstinted funds for experimenting with apparatus have enabled us to develop a plant by which Lakeside can manufacture such a gas in routine and safety, but the walls and ceilings of our room still bear marks made by the pieces of bursted retorts and our employees have not forgotten the fumes which repeatedly filled the entire hospital from the *gas plant*. It is never entirely safe to place a pot containing a nitrogenous and an oxidizing substance over a fire. Many defects in the models of apparatus and troubles in handling of the purification have been overcome and non-essentials have been eliminated, so that it would now seem to us reasonable to expect any good chief engineer to supervise the plant and train a helper to run it; yet that remains to be demonstrated.

ADVANTAGES FROM THE PLANT.

The advantages derived from owning and operating such a plant may be summed up as follows:

1. There are no tanks in the operating room to explode, get in the way, or freeze up in the middle of an administration of the anesthetic.

2. Gas manufactured each day is compressed to 100 to 150 pounds pressure in iron tanks of 350-gallon capacity, and allowed to stand over night before use. From these tanks pipes lead to the operating rooms and a reducing valve regulates the pressure in these pipes accurately. The anesthetist is therefore assured of any volume of gas at uniform pressure (three pounds is used at

Lakeside), and at room temperature, which obviates the annoyance from the freezing of gas from cylinders, and the irritation to the patient from the very cold gas inhaled, and insures an absolutely uniform rate of flow at any and all times from the same machine with the controlling valve set at a given point.

3. It is possible to use machines adapted to low pressure. The dropping of the pressure in our pipes from thirty to five pounds and adapting the machines to this pressure reduced the average consumption of nitrous oxid thirty per cent., made the breathing distinctly easier for the patient, and the anesthetic decidedly more satisfactory. We have since lowered the pressure to three pounds with still more improvement in the anesthesia and further saving of gas. For October, November and December, 1913, our average consumption of nitrous oxid per hour of anesthesia given was 444.3 gallons; for the same months of 1914 the figure was 151 gallons.

These same advantages can be secured without actually manufacturing the gas, by installing the same system of tanks, pipes and reducing valves and purchasing the gas in the largest cylinders available. The cylinders purchased are filled to high pressures (1,500 pounds, often liquefied) and will discharge 97 per cent. of their charge into tanks at 100 pounds pressure; therefore this arrangement is much more satisfactory and economical than attaching either small or large cylinders directly to the machines for administering the gas.

We do not manufacture oxygen gas; we purchase it in large cylinders at 2,000 pounds pressure and it is discharged into tanks through reducing valves at 100 to 200 pounds and sent to the operating room, in pipes parallel to the nitrous oxid pipes, at three pounds pressure, regulated by a second reducing valve. The third reducing valve on the machine for giving the gas reduces to practically atmospheric pressure. Several types of portable systems of decompressing tanks (automatic) or gasometers (hand-regulated) have been devised to secure the same results; but all such are necessarily large and cumbersome, have no advantages and take up valuable space in the operating room.

4. A large element in the cost of commercial gas is in the compression of it to high pressures for shipment. It can therefore be manufactured in small plants at about 60 per cent. of the cost of purchase. We have decided that this is a more satisfactory way to report cost than by our actual figures. The variation in the cost of a sufficiently pure ammonium nitrate will run in different localities nearly parallel to the variation in the cost of the gas, for it must be absolutely halogen-free and therefore, to be secured in the necessary quantities, must be especially made. This calculation is based on the use of 500,000 gallons per year and the employment of one man at \$70.00 per month to run the plant under the supervision of the chief engineer. This percentage, therefore, will increase if less, and decrease if more, than this amount be manufactured yearly. It covers the upkeep of the plant, but does not allow for interest or general depreciation.

5. It is an advantage to have gas of known purity, and of sufficient purity to be absolutely safe. The tanks are fitted with a small outlet for testing. We test every lot of gas made, after it is in the tank and before it is sent to the operating room.

The result upon the quality of the product of scrubbing the gas with acid, as demonstrated at Lakeside, has convinced commercial dealers. Several companies have recently installed this process in their plants, so that it is now possible to purchase a safer commercial gas than heretofore.

THE COST OF INSTALLING A PLANT.

The cost of running pipes from the plant to the operating room depends entirely upon the distance and the difficulties. It is exactly the same as for running 3/4-inch water pipe; and this figure can be determined and the work done by any plumber.

The cost of installing two storage tanks for nitrous oxid and one for oxygen, with all fittings, gate valves, pressure-reducing valves, and all accessories and labor, is about \$600.00, varying a little with the nearness to boiler works and the local price of labor. This outfit and the

pipng to the operating rooms gives the hospital the first three advantages from the plant listed above, and will save one-quarter of the cost of the gases over any method of connecting commercial cylinders of any size directly to the machines for giving the gas; and it will also make possible distinctly better anesthesia. The outfit requires one hundred square feet of floor space in the basement, or wherever it is located, for the nitrous oxid tanks, and fifty square feet for the oxygen tank.

The cost of installing a manufacturing plant modeled after the plant at Lakeside, of a size having two retorts, is \$1,500.00 to \$1,800.00 in addition to the \$600.00 for storage tanks and the cost of piping to the operating room. The exact figure varies on account of several factors, the most important of which are the facilities for connecting with water and sewer, and the method of securing the heat selected, i. e., gas, coke, oil or coal. The two-retort size is recommended for hospitals using anywhere between 100,000 and 1,000,000 gallons a year, because a mishap rarely affects both retorts. The plant to manufacture nitrous oxid will require three hundred square feet of floor space, and a small room (one hundred square feet) will also be needed for the storage of chemicals and supplies.

The additional cost of equipment to compress to liquefaction (1,500 pounds pressure) in order to fill small cylinders for use outside of the operating rooms, is \$300.00. This would be advisable in some institutions, but in others unwise, the deciding factors being the amount of compressed gas used and the local price charged for it; also the qualifications of the chief engineer, as this pressure is too high to be handled easily. This equipment will occupy fifty square feet additional. The total floor space required amounts therefore to 600 square feet.

To give the reader some idea of the amount of machinery and apparatus of which such a plant as described above consists, the accompanying sketch is printed.

In order to insure to hospitals and the profession any and all advantages or benefits from methods in use or apparatus devised, applications for patents on all new processes and special designs have been filed in Washington, and all patents granted will be held by Lakeside Hospital to guarantee the free and unrestricted use of such advantages or benefits.—(*Modern Hospital*.)

Index and Abstracts

A Résumé of the International Current
Literature of Anesthesia and Analgesia.

EDITOR'S NOTE: Authors of pertinent articles, who desire to have them indexed and abstracted, are cordially invited to send copies of the journals containing their contributions, direct to the editor, immediately on publication. Also the receipt of reprints for filing and reference will be duly appreciated.

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- ANOCI-ASSOCIATION IN THEORY AND PRACTICE. A. B. Cooke, Los Angeles. *Tennessee State Medical Association Journal*, April, 1915.
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- APPARATUS—A NEW METHOD OF ETHER ADMINISTRATION. J. W. Snyder, Michigan City, Ind. *Journal American Medical Association*, May 22, 1915.
- APPARATUS—A CONTROLLER OF TONGUE AND PALATE DURING GENERAL ANESTHESIA. Jos. E. Lombard, New York. *Journal American Medical Association*, May 22, 1915.
- CHLOROFORM AND ETHER ANESTHESIA. C. E. Vidt, Russell. *Kentucky Medical Journal*, April, 1915.
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- NERVE BLOCKING—INJECTION OF ALCOHOLIC SOLUTIONS OF DIFFERENT STRENGTHS INTO PERIPHERAL NERVES. A Comparison of the Results Obtained. William B. Cadwallader, Philadelphia. *Journal American Medical Association*, June 5, 1915.
- Nerve Blocking—Injection of the Spheno-Palatine Ganglion in some of the Commoner Diseases of the Nose.** HARRY L. POLLOCK, Chicago. *Illinois Medical Journal*, May, 1915.
- Pollock, after reviewing the anatomic topography of the subject, suggests the use of spheno-palatine injections in hay fever, spheno-palatine neuralgia, hyperesthetic rhinitis and postoperative neuralgia.
- The technic of the injection is as follows: The posterior end of the middle turbinate and nasal wall just posterior to it is obtunded with a 20 per cent. solution of cocaine. Neuralgic cases usually show immediate relief after this procedure, and this incident predicates a favorable result for the injection. Then a sword needle (Sluder) 5¼ inches long is employed. The needle is introduced from the septal side of the nose, transfixing the posterior end of the middle turbinate, after which it is pressed gently through the turbinate until the posterior wall is felt. The needle is then pushed upwards, outwards and backwards, through the bony wall, which is the anterior boundary of the spheno-maxillary fossa, in which the ganglion lies surrounded by connective tissue. Usually, by tactile sense, the operator feels the needle slip into the cavity. The ganglion is about 0.66 cm. back of the wall. A 5 c.c. Luer syringe, filled with a 2 per cent. solution of carbolic acid in alcohol, is then attached to the needle, and 5 to 15 minims of the solution injected. If the needle succeeds in penetrating the ganglion, the patient complains of excruciating pain in the eye, ear, top and back of head and into the shoulder; but should the carbolic alcohol solution merely surround the ganglion, the pain is less severe.
- The pain usually lasts anywhere from a few minutes to 24 or 48 hours, and it is in cases in which the pain is most prolonged that the end results are most gratifying. If the ganglion is injected the first time this usually suffices for a cure. Frequently further injections at short intervals are required; never more than four. In cases of neuralgia only the spheno-palatine ganglion is injected. In hyperesthetic rhinitis and hay fever it is advisable to inject the nasal branch of the ophthalmic as well. This can be successfully done by first obtunding the extreme superior anterior angle of the nose where this nerve first enters the nasal cavity, and then injecting a few drops of the solution at this point. There is comparatively no danger associated with these procedures if done under strictly aseptic precautions.
- NITROUS OXID ANESTHESIA. T. C. Burns, Oklahoma City. *Oklahoma State Medical Association Journal*, February, 1915.
- NITROUS OXID-OXYGEN ANESTHESIA FOR PAINLESS DENTISTRY. J. G. Hess, Lancaster, Pa. *Dental Cosmos*, May, 1915.
- NITROUS OXID-OXYGEN ANESTHESIA. E. R. Zemp, Knoxville. *Tennessee State Medical Association Journal*, April, 1915.

- NITROUS OXID, MANUFACTURE OF FOR HOSPITAL USE. A. R. Warner, Cleveland, O. Modern Hospital, March, 1915.
- NITROUS OXID FOR PHYSIOLOGIC WORK, ANALYSIS OF. W. M. Boothby and I. Sandiford, Boston. American Journal of Physiology, May, 1915.
- NITROUS OXID ANESTHESIA IN OBSTETRICS. J. C. Webster, Chicago. Journal American Medical Association, March 6, 1915.
- NITROUS OXID ANESTHESIA IN OBSTETRICS. Frank W. Lynch, Chicago. Journal American Medical Association, March 6, 1915.
- NITROUS OXID ANESTHESIA IN OBSTETRICS. A. E. Guedel, Indianapolis. Indiana State Medical Journal, March, 1915.
- Nitrous Oxid and Oxygen Analgesia, Eutocia by Means of.** FRANK W. LYNCH, Chicago. *Illinois Medical Journal*, April, 1915.

Lynch, in presenting this subject to the Chicago Medical Society, after recounting the historical aspects of the evolution of obstetrical analgesia, referred to the work of Kikowitch, which has to all intents and purposes been forgotten. Kikowitch started to work on the problems of obstetrical analgesia in Petrograd in 1879, shortly after Paul Bert's announcement that nitrous oxid and oxygen was a safe anesthetic for operations requiring a long period of time for their completion. In the *Archives für Gynecologie*, No. 20, 1880, he reported twenty-five cases, one of which was treated at home. He found that nitrous oxid given for three or four full respirations did not abolish consciousness, but did abolish pain, without altering the effectiveness of the uterine contractions. He proved this, to his own satisfaction, by timing the pains and their intervals both with and without gas, and by inserting a rubber balloon attached to a manometer and tambour, in three cases, to estimate the power of the expulsive force. It is astonishing that the completeness of this investigation and the satisfactory results obtained over thirty-five years ago left no influence in obstetrical literature. Perhaps the technic fell flat because Kikowitch was from Russia and because the profession was then looking for a new anesthetic rather than for a means of relieving the pain of the despised peasants in labor. Kikowitch does not mention the length of time during which the administration of the gas extended. Its administration was begun when the cervix was one and one-half finger breadths and was conducted intermittently, much as we are using it today.

Lynch's first experience with nitrous oxid-oxygen analgesia in obstetrics was in consultation with Dr. Hoag, in July, 1913. The patient was the daughter of Mr. Clark, a manufacturer of anesthetic apparatus, who was anxious to employ, at his own risk in his family, the method of preventing pain which had been so successful in dentistry.

The gas is best given through a nasal inhaler, since the proper level of analgesia is thus more easily maintained. It is started whenever the pains are troublesome or severe. Pure nitrous oxid is given at the beginning of the contraction, as determined by the hand. The patient must be cautioned not to lose consciousness, and to breathe deeply through the nose a certain number of times before bearing down. Five deep inhalations usually suffice to carry the patient *painlessly* through the most forceful contraction. At this time the inhaler should be removed or oxygen given to prevent the patient from lapsing too deeply under the anesthetic.

The key to success is the preservation of consciousness while the pain is controlled; and ultimate success depends on the co-operation of the patient. A light placed in view is a good guide to help in regulating the dose. When the light appears to waver the analgesia is too deep. The anesthetist or obstetrician must tell the patient when to begin to inhale. Left to their own devices, patients do not start to inhale until the contractions become painful, and under these circumstances the tendency is to breathe too deeply and frequently and go too deeply under. When the analgesia is carried past the proper stage a painful zone is encountered, in which cyanosis presents, associated with jactatory spasms and restlessness, and occasionally even nausea.

Gas in light dosage acts as a uterine stimulant, and the distention of the perineum is so thoroughly obtunded that frequently it is advisable to resort to complete anesthesia, at the moment of birth or to deliver between pains, to prevent too unexpected a delivery. It is often a matter of remark that infants delivered by Cesarean section under gas are not nearly so deeply anesthetized as when ether or chloroform has been used. No case I have as yet observed with this new method of obstetrical analgesia has presented a definite oligopnea. Respiration has been immediately established.

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SHOCKLESS OPERATIONS.

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The clinical picture of shock, following injury or operation, is familiar to every experienced physician. Various theories have been advanced to explain the phenomena connected with this condition, but none of them has been accepted as entirely satisfactory. The latest theory is that of Crile, based upon certain findings in his private laboratory. Unfortunately, however, these findings have not been corroborated by workers in other laboratories, whose reports, on the contrary, so far as published, have been antagonistic to his theory.

While it is universally conceded that excessive hemorrhage is the most common cause of shock, it must be admitted that certain traumatisms may produce the same clinical symptoms,* but just how these symptoms are produced is a question which has not been answered. If Crile's theory is correct, then more or less shock should be found in all extensive operations in which no precautions are taken to block by injections the nerves connecting the field of operation with the brain centers. If shock frequently appeared when no injections were used, and did not appear when they were used, the problem would be greatly simplified.

The promptness and unanimity with which operators who have adopted anoci-association attribute absence of shock in their operations to the use of the injections, would be purely amusing did it not present such a pitiful illustration of illogical thinking. Crile's theory is beautifully simple, and, presented in his captivating way, it naturally leads superficial thinkers astray, so that their reasoning assumes the *post hoc ergo propter hoc* circle, while a more logical mind might regard it all as purely a *non sequitur*.

A rude operator, who accomplishes his end largely by mere brute force, who is indifferent as to hemorrhage, and careless as to protection of his

field of operation, will doubtless meet with much shock; and if he later learns gentler methods, is more cautious as to hemostasis, and more careful in protecting the operative field, he will find the shock disappear, and if in the meantime he has been induced to use the so-called "anoci-association" he may be deluded into attributing all his improvement to the latter while ignoring the former essentials. Crile is a fine anatomist, an accomplished surgeon, and a skillful operator, and I suspect that in his modesty he has mistaken the results of his own skill for the results of his "anoci-association."

While fear and anxiety on the part of the patient are undesirable, it is very doubtful if those conditions alone will produce shock. At least out of an experience of nearly ten thousand abdominal operations I have never met with a single instance, although I have operated on patients who were almost frantic from fear, with a resulting high pulse rate, and even an elevation of temperature which could be explained by nothing in the physical condition; yet after the operation (an hysterectomy perhaps) temperature and pulse have at once dropped to normal, and the patients have made an absolutely smooth convalescence. Nevertheless, the experienced surgeon will naturally possess a hopeful mental attitude, and will impart more or less of his own optimism to his patient. In that way he will change her attitude of fear to one of hope and courage. In these cases the administration of scopolamin-morphin, an hour before the giving of the anesthetic, is very helpful, and many patients, although really awake when the anesthetic is commenced, have no recollection of it, and when coming out from the anesthesia a number of hours later can hardly be convinced that an operation has been performed.

After discussing this matter with a colleague in December, I decided to take particular notice of my own operative cases for the next month or two, and see what, if any, shock occurred from operations *per se*. In my regular routine work during sixty days (January 1-March 1) I performed 120 major operations. During this time I did many minor operations, but in none of the operations, whether major or minor, did there appear any sug-

*"The most common cause of so-called surgical shock is collapse from loss of blood, and traumatism of important structures in hasty attempts to control hemorrhage."—W. J. Mayo, "Journ. A. M. A.," March 20, 1915.

gestion of that combination of symptoms which we call shock.

The anesthetic used in all the cases was the drop-ether, preceded (except in children) by a hypodermatic injection of 1/6 grain morphin and 1/100 grain scopolamin. This is a combination I have used for many years, and in thousands of cases, and with only the most gratifying results.

My patients are all private patients, and during convalescence are looked after daily by myself. They are seen during the few days following operation not less than twice a day, oftener if necessary, and then once a day during the later convalescence.

Operations are performed as rapidly as is consistent with thoroughness, and the patients usually sleep quietly for an hour or more after returning to their rooms. Post-operative nausea occurs in some cases, but in others there is no complaint whatever. The same is true of gas pains, though fewer escape the latter than escape the nausea. Care is taken, in closing the incisions, that the parts are brought into apposition, but not so tightly as to interfere with either the nerves or blood-vessels in the line of suture. Too great tension is, I think, responsible for much local post-operative pain. As a result, in a number of cases patients who have had abdominal operations performed without their knowledge have suspected nothing of it until the first dressing at the end of the week. Patients usually greet me on the morning after operation with a pleasant smile, and except that they may have had some stomach disturbance express themselves as feeling quite well; are, indeed, generally pleasantly disappointed by the absence of disagreeable sensations.

That the injection of urea and quinine into the field of operation so obtunds sensibility as to relieve some of the post-operative pain about the wound is undoubtedly true; but if care is taken in adjusting and closing the wound, bringing the parts into snug but not too tight apposition, patients will have little cause for complaint. It is notorious that post-operative wound infection is much more common in cases in which the quinine and urea have been used than in those in which the usual closure is made, and many surgeons who have used this combination for purposes of local anesthesia have complained of infection and even sloughing of the edges of the incision. Whether the increased liability to infection is due to the drugs themselves, or to trophic changes due to interference with innervation, has probably never been positively determined; but the fact remains, and most patients would prefer to have the slight increase of his comfort from the non-use of the quinine and urea than

to suffer from the greater and more prolonged disturbance connected with the post-operative infection.

At the present time we are hearing very much about "twilight sleep" in connection with obstetrical practice, and those who use it claim that, owing to the absence of pain and anxiety, the patients are remarkably free from the depressing effects of the confinement, and are ready to be up and around, if permitted, within forty-eight or even within twenty-four hours. If the theory of brain-cell exhaustion from unfelt pain is correct, these patients should all show more or less signs of shock, but the advocates of the method claim that the reverse is true.

A number of years ago a head nurse, who came to the Grant Hospital from an institution in the East, repeatedly expressed her surprise at the absence of shock which she found in our operative cases. In talking with her I found that the surgeons she had previously served had been in the habit of taking an hour or two to make a twenty-minute operation; they had been rather indifferent to hemorrhage and to protecting the field of operation, and they had not employed the delicacy of touch in intra-abdominal work which due respect for that field of operation demands; hence the presence of shock there and its absence here.

There is undoubtedly a large number of surgeons in the country who could from their records more than duplicate my report of shockless cases. I have talked with many such surgeons, and they tell me that they do not have shock in their work, except under conditions which have been previously mentioned. Shockless operations are the rule, the others the rare exception.

Within the last few weeks I have known of two deaths from shock, one from an exploratory incision with considerable manipulation of the parts, the other from an abdominal hysterectomy for fibroid. In both the operator, who is a firm believer in anoci-association, had used his local injections and had administered nitrous oxide-oxygen instead of ether. The contrast was painful, but the pain was not mine.

In my abdominal operations the appendix is practically always removed as a routine procedure, even if it presents no gross evidence of disease. In the appended report the appendix was so removed, though it does not appear in the printed record.

I am a firm believer in the importance of decayed teeth in the production of many constitutional disturbances, and consequently in all cases my anesthesiologist at the completion of the operation examines

the teeth, and if old roots or rotten teeth are discovered which are past saving by the dentist, they are at once extracted; and many a patient has really shown more gratitude for the removal of these old teeth than for the removal of the pathology for which the operation was undertaken.

In operating for uterine cancer, unless there are positive contraindications, I perform the usual radical Wertheim operation, with preliminary ligation of both internal iliacs as recommended by Cobb. The ligation of these vessels renders the operation almost bloodless, and this hemostasis obviates shock.

In operating for cancer of the breast, the usual "dinner-plate" operation of Rodman is ordinarily pursued, with a thorough dissection of the axilla, but saving enough of the pectoralis major to protect the axillary vessels, as recommended by Murphy. In many of these cases it is necessary to make transverse incisions, with undermining of the opposite breast, so as to bring it over to cover the raw surface.

In cases of gangrenous appendicitis, temporary drainage is usually advisable. This is done by making a stab incision in close proximity to the anterior-superior spine, and passing from within out a cigarette drain, together with the catgut ligatures which have been used and have been left long. By a little traction on these ligatures the cecum can usually be so adjusted as to lie in contact with the wick, so that there will be no post-operative ileus from adhesions involving the small bowel. The main incision is closed thoroughly so as to obviate, if possible, post-operative hernia.

The case of macroglossia (No. 31) is reported as a major operation, because of the special feebleness of the infant, which, owing to the large size of the tongue and its protrusion, had become so weakened by lack of food as to render amputation of the tongue particularly hazardous.

The hip-joint amputation (No. 87) was in a slender and anemic woman, whose leg was nearly as large as her body. I have performed in all about ten hip-joint amputations, using the Wyeth method, without shock and without mortality.

Deaths.—The deaths reported are all that took place following these operations, and no patients were hurried out of the hospital to improve the statistics. Statistics are entirely unreliable unless we know just how they are obtained. Some well-known surgeons exclude from their reports a considerable number of cases who have died after operations, but in which death was not due to the operation itself. Such methods of securing statistics are very unreliable, since the personal equation

is so uncertain, and the results may be quite fantastic.

Number 24. This patient was first operated upon under Number 23. She was then found to have uterine hyperplasia, with a mass of pelvic adhesions, requiring a supravaginal pan-hysterectomy. In addition she was suffering from pronounced intestinal obstruction which was found due to seven strictures of the small bowel, these strictures having resulted from tuberculous ulcerations. At the first operation the three tightest strictures were cared for by an intestinal anastomosis above and below the strictures. The condition of the patient was then such as to render it unsafe to treat the four remaining strictures, which were not quite so tight. She made an excellent recovery, and three weeks later the other four strictures were relieved by lateral anastomoses. She went through this operation nicely, but at one point, because of the condition of the intestinal wall, a cigarette drain was inserted. Here, as feared, an intestinal fistula formed, which after discharging freely for a few days closed down, until at the time of her death some weeks later there was little discharge. She died of exhaustion from tuberculosis some three weeks after the second operation.

Number 58. This patient had had serious stomach trouble for ten years, worse of late, with a strong suspicion of malignancy implanted on gastric ulcer. The ulcer was found in the posterior wall of the pylorus, with much exudate, thoroughly organized. A pylorotomy was done in the usual way, but with great difficulty on account of the extensive adhesions and exudate. The man did well after the operation for forty-eight hours, then became suddenly restless, with poor pulse, air-hunger, absence of second heart sound, and the usual symptoms of heart clot. He died in a few hours.

Number 74. This patient was in desperate condition at the time of the operation, which was for the removal of an ovarian tumor with twisted pedicle, which was found to be papillomatous, with extensive metastases involving the upper abdomen. She went through the operation very satisfactorily, and for several days bid fair to make an excellent operative recovery, but died suddenly on the fifth day. Immediate cause of death not found at necropsy.

Number 83. This was a case of chronic metritis with extensive adhesions. While apparently convalescing well, she died suddenly on the seventh day, probably from pulmonary embolism.

Number 100. This patient was operated upon for umbilical hernia and gall-stones. She was very

No.	Initials.	Sex.	Age.	Operations.
1.	E.G.A.	M.	36.	Pylorectomy.
2.	C.L.A.	F.	38.	Appendectomy (gangrenous-drainage).
3.	A.L.A.	F.	44.	Supravaginal pan-hysterectomy.
4.	C.F.A.	F.	45.	Supravaginal pan-hysterectomy.
5.	H.A.B.	M.	35.	Resected cecum; lateral anastomosis.
6.	S.B.	M.	12.	Estlander operation.
7.	E.B.	F.	36.	Cholecystectomy.
8.	J.W.B.	F.	41.	Appendectomy.
9.	E.B.	F.	43.	Supravaginal pan-hysterectomy.
10.	R.B.	M.	25.	Appendectomy.
11.	C.C.	M.	64.	Cancer of neck. Extensive dissection.
12.	C.C.	F.	45.	Cancer of breast and axilla: double ovariectomy: double salpingectomy.
13.	R.V.C.	F.	50.	Radical hysterectomy for cancer.
14.	K.C.	F.	27.	Abdominal pan-hysterectomy (saved ovaries).
15.	A.DeY.	F.	40.	Supravaginal pan-hysterectomy.
16.	F.H.D.	F.	28.	Appendectomy.
17.	W.A.D.	F.	27.	Abdominal pan-hysterectomy (saved ovaries).
18.	H.D.	F.	20.	Appendectomy: shortened round ligaments.
19.	C.E.	F.	21.	Appendectomy (gangrenous-drainage).
20.	H.E.F.	F.	40.	Amputated cervix: perineorrhaphy; doub. salp.; short. r. ligs.; cholecystectomy.
21.	Z.F.	F.	64.	Wertheim operation for procidentia.
22.	E.H.G.	M.	23.	Appendectomy.
23.	H.W.G.	F.	39.	Supravag. pan-hyst.; doub. intest. anastomosis for tuberculous strictures.
24.	H.W.G.	F.	39.	Four intestinal anastomoses for tuberculous strictures.
25.	O.O.G.	F.	44.	Abdominal pan-hysterectomy; posterior colporrhaphy; perineorrhaphy.
26.	C.G.	F.	58.	Cancer of breast and axilla.
27.	E.G.	M.	29.	"General purulent peritonitis" (appendiceal). Fowler position, etc.
28.	M.G.	F.	19.	Appendectomy.
29.	R.N.G.	F.	45.	Supravaginal pan-hysterectomy.
30.	R.L.H.	M.	24.	Double inguinal hernia.
31.	C.C.H.	M.	2.	Macroglossia: resection of tongue.
32.	V.H.	F.	18.	Appendectomy.
33.	F.H.	F.	33.	Abdominal pan-hysterectomy (saved one ovary).
34.	W.H.	F.	36.	Exploratory incision. Inop. cancer of mesentery. Double salpingectomy.
35.	L.H.H.	F.	28.	Amp. cervix; post. colporrhaphy; perineorrhaphy; d. salp.; short. r. ut. sac. ligs.
36.	D.H.	F.	34.	Supravag. pan-hyst. (saved one ovary).
37.	E.J.H.	F.	30.	Supravaginal pan-hysterectomy (saved both ovaries).
38.	I.H.	F.	21.	Appendectomy.
39.	C.H.	F.	37.	Abdominal pan-hysterectomy.
40.	L.L.H.	F.	66.	Wertheim operation for procidentia.
41.	E.R.J.	F.	53.	Abdominal pan-hysterectomy. Cholecystectomy.
42.	M.E.K.	F.	36.	Supravaginal pan-hysterectomy (saved one ovary).
43.	S.W.K.	M.	37.	Inguinal hernia; resected omentum.
44.	C.K.	M.	21.	Appendectomy.
45.	W.S.K.	M.	49.	Appendectomy (gangrenous-drainage).
46.	J.W.K.	F.	32.	Abdominal pan-hysterectomy. (Puerperal-abdominal and vaginal drainage.)
47.	E.S.K.	M.	58.	Cholecystectomy. Appendectomy.
48.	J.G.K.	F.	60.	Wertheim operation for procidentia.
49.	F.P.L.	F.	45.	Ovariectomy and salpingectomy.
50.	W.R.L.	F.	34.	Amp. cervix; post. colporrhaphy; perineorrhaphy; doub. salping.; short. ligaments.
51.	G.M.L.	F.	51.	Supravaginal pan-hysterectomy. Cholecystectomy.
52.	F.L.	F.	16.	Tuberculous peritonitis.
53.	J.F.L.	F.	78.	Large ovarian cyst. Shortened ligaments.
54.	J.L.	F.	59.	Radical pan-hysterectomy for cancer.
55.	H.M.	F.	41.	Double ovarian papillomas.
56.	C.F.M.	F.	42.	Cancer of breast and axilla.
57.	J.S.M.	M.	23.	Appendectomy (gangrenous-drainage).
58.	C.H.M.	M.	42.	Pylorectomy. Gastro-enterostomy.
59.	J.C.M.	F.	33.	Abdominal pan-hyst. (saved ovaries). Perineorrhaphy. Amputated breast.
60.	J.M.	F.	30.	Abdominal pan-hysterectomy. Posterior colporrhaphy. Perineorrhaphy.
61.	H.R.M.	F.	35.	Abdominal pan-hysterectomy. Posterior colporrhaphy. Perineorrhaphy.
62.	C.M.	F.	25.	Cesarean section.
63.	C.E.M.	M.	34.	Appendectomy.
64.	A.M.	F.	49.	Ovariectomy (large tumor).
65.	C.V.M.	F.	51.	Supra-vaginal pan-hysterectomy. Cholecystectomy.
66.	E.S.M.	F.	24.	Shortened round ligaments; elevated utero-vesical fold.
67.	J.M.M.	F.	58.	Ovarian dermoid.
68.	L.M.	M.	16.	Right inguinal hernia; appendectomy.
69.	A.M.	M.	22.	Appendectomy.
70.	M.M.	F.	41.	Sarcoma of breast.
71.	J.R.M.	F.	55.	Radical hysterectomy for cancer.
72.	I.M.	F.	46.	Double ovariectomy; double salpingectomy; shortened ligaments. Cholecystectomy.
73.	W.M.M.	M.	29.	Inguinal hernia.
74.	M.N.	F.	53.	Ovarian papilloma with metastases.
75.	F.P.	F.	27.	Myomectomy. Shortened ligaments.
76.	S.P.	F.	40.	Double tubo-ovarian abscesses (drainage).
77.	E.P.	F.	29.	Amputated cervix; ovariectomy; shortened ligaments.
78.	I.P.	F.	43.	Abdominal pan-hysterectomy.
79.	H.P.	F.	14.	Appendectomy.
80.	J.R.P.	F.	35.	Amputated cervix; salpingectomy; shortened ligaments.

No.	Initials.	Sex.	Age.	Operations.
81.	A.F.P.	F.	44.	Supra-vaginal pan-hysterectomy.
82.	W.M.P.	F.	42.	Radical hysterectomy for cancer.
83.	W.R.	F.	41.	Abdominal pan-hysterectomy.
84.	F.R.	F.	30.	Double tubo-ovarian abscesses; abdominal-vaginal drainage.
85.	N.R.	F.	22.	Appendectomy.
86.	H.L.R.	F.	35.	Supra-vaginal pan-hysterectomy (saved both ovaries).
87.	F.M.R.	F.	29.	Hip-joint amputation for elephantiasis.
88.	S.G.R.	F.	29.	Abdominal pan-hysterectomy (saved both ovaries).
89.	G.H.R.	M.	30.	Inguinal hernia.
90.	R.W.S.	F.	24.	Abdominal pan-hysterectomy (saved both ovaries).
91.	A.S.	F.	29.	Shortened uterine ligaments.
92.	Z.S.	F.	34.	Shortened uterine ligaments.
93.	W.L.S.	F.	34.	Supra-vaginal pan-hysterectomy (saved one ovary).
94.	S.H.S.	F.	52.	Gastro-enterostomy. Resected pylorus. Anchored right kidney.
95.	W.H.S.	F.	46.	Supra-vaginal pan-hysterectomy.
96.	F.D.S.	F.	53.	Radical hysterectomy for cancer.
97.	M.A.S.	F.	40.	Abdominal pan-hysterectomy.
98.	C.S.	F.	23.	Supra-vaginal pan-hysterectomy (saved both ovaries).
99.	R.G.S.	F.	25.	Shortened uterine ligaments.
100.	W.H.S.	F.	43.	Cholecystectomy. Umbilical hernia. Lipectomy.
101.	M.S.	F.	55.	Radical hysterectomy for cancer.
102.	E.T.	F.	23.	Double pyosalpinx.
103.	A.T.	F.	60.	Cholecystectomy (cancer of liver).
104.	C.W.T.	M.	45.	Resection of transverse colon for cancer; lateral anastomosis.
105.	J.M.T.	F.	28.	Abdominal pan-hysterectomy (saved one ovary). Post. colporrhaphy. Perineorrhaphy.
106.	I.C.T.	F.	63.	Irreducible inguinal hernia.
107.	M.T.	F.	26.	Double salpingectomy; shortened ligaments.
108.	E.E.T.	F.	26.	Resected ovary.
109.	M.V.	F.	53.	Radical hysterectomy for cancer.
110.	W.W.V.	F.	50.	Wertheim operation for procidentia. Cholecystectomy.
111.	C.W.	M.	17.	Appendectomy (gangrenous-drainage).
112.	E.E.W.	F.	26.	Supra-vaginal pan-hysterectomy (saved one ovary).
113.	L.W.	F.	27.	Double salpingectomy. Shortened uterine ligaments.
114.	C.W.W.	M.	33.	Appendectomy.
115.	J.W.	F.	57.	Cholecystectomy. Nephrectomy (hypernephroma). Myomectomy.
116.	L.W.	M.	4.	Inguinal hernia.
117.	D.J.W.	F.	41.	Cancer of breast and axilla.
118.	L.Y.	F.	28.	Abdominal pan-hysterectomy (saved both ovaries).
119.	M.Y.	F.	18.	Double salpingectomy; shortened uterine ligaments. (Puerperal infection.)
120.	E.Z.	F.	22.	Amputation at knee.

fleshy, weighing about 300 pounds, and in closing the umbilical hernia a lipectomy was done for her relief. She went through the operation easily, but died suddenly, as though from embolism, on the second day.

Number 101. This patient was operated upon for advanced cancer of the uterus, the usual radical operation with ligation of the internal iliacs. She did well for a week, but then commenced failing and died of exhaustion about three weeks after her operation. The disease was found to be more extensive at the time of her operation than had been anticipated, and should have been regarded as inoperable.

Number 103. This was a difficult cholecystectomy for gall-stones, with extensive exudate and a cancerous development involving the deeper structures, and metastasis to the liver. She was greatly relieved by the operation with its drainage of the bile ducts, but died of exhaustion some weeks later.

CONCLUSIONS.

(1) Crile's laboratory findings, showing exhausted brain cells, on which he bases his theory of shock, have not been confirmed by independent laboratory workers, and such confirmation is clearly very desirable.

(2) Operative shock, from a practical standpoint, is the result of hemorrhage, or of undue and usually necessary traumatism in the field of operation.

(3) Prolonged operations, by the long exposure of the field of operation and the prolonged anesthesia, materially increase the liability to shock, so that a moderate hemorrhage, which would not produce any ill-effects in a short operation, may result in marked shock.

(4) Any surgeon who operates rapidly, who guards against unnecessary hemorrhage, and who avoids brutality in handling tissues, will have shockless operations.

LOCAL ANESTHESIA IN INGUINAL HERNIA.

In the case of an ordinary inguinal hernia, having determined the length of the incision, the anesthesia needle is applied about one-half inch above the termination of the incision, and the subcutaneous tissue is then infiltrated the entire length of the proposed incision. The needle is now pushed deeply in, and the abdominal coverings are thoroughly injected with the fluid. The needle is next inserted just below the external ring and then, as it is pushed downward, the tissues around the cord with the ilioinguinal nerve are anesthetized. I believe that by delaying the operation for at least twenty minutes, a much more bloodless field is produced.—CARLISLE P. KNIGHT in the *New York Medical Journal*.

SOME DANGERS ATTENDING THE UN-
GUARDED USE OF ETHER: OBSER-
VATIONS CONCERNING ITS
INFLAMMABILITY.

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It has long been known to physician and chemist alike that ether, as well as its vapor, is highly inflammable, and under certain conditions may ignite and cause serious trouble. No one doing surgery, therefore, can afford to be careless about the use of this particular anesthetic in the presence of an open flame. It is necessary quite frequently to operate in a private house, with low ceilings, under the guidance of a gas or lamp light, either of which is sometimes brought near to the patient. Great care should be exercised on such occasions, for while accidents rarely happen, yet, when they do, they are not only fraught with danger, but are keenly embarrassing to the surgeon and his assistants.

Much is being said in medical literature about the comparative safety of the various anesthetics, but, since the advent of the new cauteries, certain unusual dangers have not been sufficiently emphasized. At least I have felt so, especially after an incident which, though resulting favorably to everyone, for a moment caused consternation and havoc. It occurred during the cauterization of an epithelioma of the malar region in a man, who was receiving ether by the drop method from a very careful anesthetist. The instrument was an auto-ether cautery, which had done excellent service many times previously. Suddenly, when the work was almost completed, the ether vapor ignited and instantly spread to every article or substance which held the fumes. The flames completely enveloped the patient's face and mouth, and quickly extended to the mask, which, with the container, had by this time dropped to the floor, where the fire rapidly gained headway on account of the ether, which had spattered in all directions. The exploding vapor was, of course, soon extinguished, but the various fabrics upon which the ether had been deposited burned furiously. Intense excitement prevailed for a moment, but by timely dexterity the flames were extinguished and no harm whatever was done to the patient. Had the accident occurred in the presence of nervous, untrained assistants, the result might have been disastrous. On account of this unexpected event, an extensive investigation was conducted in order to determine the environment under which ether is inflammable, and therefore dangerous. Some of the findings proved to be an actual surprise.

Ether vapor is two and one-half times heavier than air, and does not rise very high above the operator or patient. This fact has much significance, but there are many other features which are not only interesting, but quite valuable to one who would fully understand the character of ether and its behavior under various circumstances. The manner in which the experimental work was conducted may be assumed from a study of the results which follow. Tedious enumeration of detail will be omitted.

A red-hot iron may be plunged into ether without producing any ill-effects, except to produce a penetrating gas which, like formaldehyde, is very irritating to the ocular and nasal mucus membranes. The iron is cooled as it would be if held in water. Ether set free in an open vessel rapidly scents the entire room in which it is exposed. This vapor, easily detected by the sense of smell, is entirely free from any explosive tendency, being greatly rarefied. Ether vapor is indeed very dense and heavy, even invisible, settling rapidly, like mist, upon the nearest surface. This is shown by the fact that a lighted match or candle may be held two inches above the level of ether in an open container for three minutes without ignition. On account of the great weight and density of ether fumes, blowing over a saturated sponge, draughts in a room, or fanning movements, seem to have little effect in displacing the vapor in its condensed form; on the contrary, it is thinned and disseminated. This does not hold true in case of etherization, in which anesthesia is carried over a long period of time, in a small, badly ventilated room. Here the patient's respiration, in an atmosphere continually saturated with ether, would tend to drive the heavy vapor farther and farther away, with less rarefaction. Yet, this being true, ether evaporates so very rapidly as to become less and less inflammable, the farther one is removed from the place where it is exposed, unless, of course, enormous quantities are set free. The danger point with ether lies within a rather large area, surrounding the mask. Ether vapor falls until it reaches some object, then follows the surface of that object, whatever it may be—the patient's body, the operating table, the floor—till rarefaction takes place.

The most peculiar characteristic disclosed during the entire experimental process was the constant tendency of ether vapor to cling to surfaces. The smoother the material—porcelain, glass, wood—the more readily the vapor follows it. If a sponge, saturated with ether, is gently placed at one end of a table, or on the floor, or in an ordinary sink, and a lighted match held two feet away and close

to the table, the floor or the bottom of the sink, the vapor will quickly ignite and burn over a considerable surface. The light must be held close to the table. Even two inches above will not suffice. This shows how, mist-like, the heavy vapor not only settles but clings tenaciously to the surface as it instantly spreads in all directions. A saturated sponge, dropped to the floor, close to a flame or lighted match, will also take fire and burn over an area two or three feet square. A sponge saturated with ether and held one foot above a flame will ignite promptly. Beyond this distance there is little or no danger unless the ether drips from the sponge, the weight of the vapor and its tendency to settle being offset in this instance by rapid evaporation.

Although ether vapor is heavy, ether itself, if mixed with water, will always rise to the surface until a proportion of 1-400 is reached. The inability of ether and water to form a solution, is also shown by the fact that, after they are well shaken together and poured into an evaporating dish or upon a sponge, the ether will burn as freely as before until exhausted.

A sponge saturated with ether and ignited cannot be easily extinguished by the application of water. The water, on the contrary, will displace the ether in many directions, carrying the flames with it. Likewise, a bowl containing ether, which is burning, may have water added till it overflows, without disturbing the flames. Water, dashed into a vessel in which ether is burning, simply scatters the fire. The same thing happens when one tries to stamp out a blazing sponge or mass of cotton containing ether. Not only is it a difficult task, but the burning ether clings to the shoe, and may set fire to the clothing of the physician or nurse, or be carried from place to place about the room. Water seems to have very little effect upon burning ether, unless the entire fabric is completely submerged. Indeed, if applied carelessly and with force, it may alarmingly increase the conflagration. A burning ether sponge, kicked or flung across the room, will widely distribute the fire in small quantities. A gauze screen is not readily penetrated by ether fumes, so that an open cautery or other flame will not ignite the vapor, even at the short distance of two inches, if a screen intervenes.

Some valuable deductions may be drawn from the result of these experiments. We need to be reminded occasionally that ether is dangerously inflammable. Its characteristics are peculiar. Ether vapor does not rise perceptibly above the level at which it is generated, but descends to the nearest surface, along which it quickly disseminates itself in every direction. If an open flame is introduced

anywhere along this surface, within a radius of two feet, an explosion may take place. Vaporized ether is rarefied as it settles, and, in passing through a distance of three or four feet, loses most of its explosive character. On account of the great tendency to rarefaction, continuous administration of ether in a given closed space, in which there is an open flame burning, is not dangerous, unless large quantities are used, and the fire or light brought within three feet of the mask. The opposite holds true regarding certain other gases, as illuminating gas, which, continually escaping in a closed room, for a certain length of time, will explode with tremendous destruction, as soon as a lighted candle is brought into its presence. An open flame, gas jet, high frequency spark, or ether cautery should not be permitted within three feet of the mask during etherization of a patient, if the flame or light is on a level with the patient's face, and by no means if a table or other unobstructed surface intervenes between the flame and the mask.

In this connection let me refer with caution to those operating rooms in which, for want of space, there may be a part of the sterilizing outfit in use at the time of the operation: to private house surgery, where, during etherization, the patient's head, perhaps from necessity, is located dangerously near to a burning gas or coal range, the kitchen having been transformed into an emergency operating room; to anxious assistants and friends who, while some surgical procedure is being carried on, are obliged to hold the light for the operator.

Cauterization about the cervix and perineum, by means of an open flame cautery, may be dangerous, if the cautery is brought close to the surface of the table, especially if the patient is in the lateral or Sims's position. Still more dangerous is cauterization of the thorax, neck, or face. A screen should be used when possible, for even though the mask is laid aside, the ether exhaled by the patient is inflammable.

If the unexpected should happen and the vapor ignite (and once in a lifetime is enough to make a profound impression upon the operator), the flame should be quickly and methodically smothered, beginning at the patient's face. The fire will be everywhere in the twinkling of an eye. Water, unless used in large quantities, has almost no effect except to agitate the trouble. A can of ether, an ether mask, or sponges saturated with ether, should not be thrown to the floor or kicked around during excitement. They may seriously enhance the destructive process, or even set fire to clothing and other fabrics about the room. Stamping out the flame, here and there over the floor, while somewhat effective,

may easily ignite the trouser leg and still further increase the fire.

Dexterity, and good judgment well displayed, will, with the above directions, clear up the worst situation. Satisfactory results, following the various casualties of the operating room, however, are usually traceable to good fortune rather than careful management, since many physicians and nurses are not at home in the presence of sudden and unusual danger threatening human life.

ARE COCAINE SOLUTIONS INJURED BY BOILING?*

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That solutions of cocaine salts have their anesthetic properties injured by boiling seems to be a belief rather generally accepted by the medical profession, and is so taught in the medical schools, schools of pharmacy, and nurses' training schools.

Some writers on ophthalmology and ophthalmic surgery give us no definite information on this point; some tell us that boiling is injurious, while a few, usually very guardedly, say that they have boiled these solutions to render them sterile.

Having read many of the indefinite and conflicting statements of these authors, and knowing that all my friends were afraid to sterilize their cocaine solutions by boiling, I determined to satisfy myself on this point, although it had been my practice for several years to boil these solutions before using them in any serious surgical operation.

The solutions used in these tests has been those of cocaine muriate, of 4 per cent. strength. They were not boiled in a water-bath, but over an Argand gas flame in my office.

I have found that the boiling was most conveniently done by placing a half ounce of the solution in an ounce bottle, which should be loosely corked with cotton during the boiling. Grasp the neck of the bottle with a long dressing forceps and bring it down over the flame slowly, so as not to break the bottle by rapid heating. When large bubbles begin to rise through the solution boiling has begun and it should be thus continued for the desired time.

This boiling naturally produces evaporation of the water and concentration of the solution. This concentration was not interfered with in test solutions No. 1 and No. 2, but in test solutions No. 3, No. 4, and No. 5 sterile water was added after each boiling to restore the volume and adjust strength of the solution.

I have not hastened in making these observations, but allowed several weeks to intervene between the first and last boilings of each solution, thinking that time might augment the destructiveness of the boilings.

Solution No. 4 had been in my office for two months and given no particular care before it was placed in the test.

In none of these tests have large quantities of the solution been used. When foreign bodies were to be removed from the cornea, or when the conjunctiva was to be manipulated or incised, I usually employed two instillations of one or two drops each, with an interval of two or three minutes. In cases in which the anterior chamber was to be opened, I usually used not more than five instillations at intervals of one and a half to two minutes.

SOLUTION NO. I.

This solution was secured from the druggist on April 15, 1914, and used in two cases to prove its anesthetic value before boiling.

On April 17 it was boiled in the bottle for three minutes; on April 20 and again on the April 23 it was used in the removal of foreign bodies from the cornea. On April 24 it was used in the extraction of a senile cataract.

April 25 the solution was boiled a second time for three minutes. On April 28 and May 1 pupils were dilated preparatory to examination of the fundus. On April 30 it was used in the removal of a foreign body from the cornea.

May 4 the solution was boiled a third time for three minutes, after which it was used as follows: May 4, in the removal of a foreign body from the cornea. May 11, in needling a soft cataract.

SOLUTION NO. II.

This solution was purchased May 15, 1914, and used to test its anesthetic value, after which it was boiled three minutes. May 17, this solution gave satisfactory anesthesia for the extraction of a senile cataract.

May 18 the solution was boiled the second time. May 20 it was used in the removal of a foreign body from the cornea.

May 21 this solution was boiled a third time for three minutes. May 22 it gave satisfactory anesthesia for the removal of a foreign body which was imbedded in the cornea.

After this trial the remaining portion of this solution was poured into the bottle with the remaining portion of solution No. 1 and the combined solutions were boiled for three minutes. This solution, which had now been boiled four times, gave good anesthesia on May 25 and 26 for the removal of

*Re: 1 before the Ophthalmic Section of the New York Academy of Medicine, February 15, 1915.

foreign bodies from the cornea. More boilings were impossible because of the small amount of solution remaining.

SOLUTION NO. III.

This 4 per cent. solution of cocaine muriate was purchased on May 29, and on June 1 it was boiled over a gas flame for three minutes, after which sterile water was added to replace the evaporation and restore the strength of the solution. This solution then gave good anesthesia as follows:

June 8, for the removal of a foreign body from the cornea. June 9, for cauterizing a corneal ulcer with phenol.

June 10 the solution was boiled a second time for three minutes and water added to replace the evaporation. The solution then gave satisfactory anesthesia as follows:

June 11, for removal of a foreign body from the cornea, in two cases. June 15th, for incision of the cornea in removing a membranous cataract.

June 18 this solution was boiled the third time for three minutes and water added to replace the evaporation. The same day this solution was used in the removal of a foreign body from the cornea, and also for cauterizing an ulcer of the cornea.

June 19 the solution was boiled for the fourth time for three minutes and water added to replace the evaporation. It was then used on the 27th and 29th of June for the removal of foreign bodies from the cornea.

June 29th the solution was boiled for the fifth time and water added as before. July 2 it was used as the anesthetic in two cases of removal of foreign bodies from the cornea.

July 3 the solution was boiled the sixth time for three minutes and water added to replace the evaporation. It was then used as follows:

July 3, for tenotomy in one case and for dilating the pupil in another. July 4, for cauterizing an ulcer of the cornea with phenol.

July 6 the solution was boiled the seventh time and water added as before. Its use then gave satisfactory results as follows:

July 6, for the use of the tonometer. July 9, for the removal of a foreign body from the cornea. Sept. 9, for dilating a pupil for fundus examination.

SOLUTION NO. IV.

This solution has been on my office treatment table since May 17, 1914, and had been used several times for various purposes.

July 18 it was boiled in the bottle over a gas flame for three minutes, after which sterile water was added to replace the evaporation. The solution was then used with satisfaction in the following cases:

July 21, first, in the removal of a foreign body from the cornea; second, in a discission operation; third, in the extraction of a senile cataract. July 22 and July 30, in the removal of foreign bodies from the cornea, in four cases.

July 31 the solution was boiled the third time, and water added as before. It was then used satisfactorily in the following cases:

August 19, in the removal of a foreign body from the cornea. August 20, in a tenotomy operation.

August 20, after the above use, it was boiled for the fourth time and water added as before.

August 22 it gave good anesthesia for the removal of a foreign body from the cornea.

August 30 the solution was boiled the fifth time and water added as before. It was then used in the following cases:

August 31, in dilating a pupil for examination of the fundus. September 3, in removing a foreign body from the cornea. September 8, in a tenotomy operation.

September 9 the solution was boiled for the sixth time and water added as before.

September 10 and September 15 the solution produced satisfactory anesthesia for the removal of foreign bodies from the cornea.

September 24 the solution was boiled for the seventh time and water added as before. After this boiling the solution was used as follows:

September 27, in the removal of a foreign body from the cornea. October 1, in cauterizing a corneal ulcer with phenol.

After these uses the small remaining portion of this solution was added to the remaining portion of solution No. 3 (each having been boiled seven times), and the combined solution boiled three minutes as before and sterile water added to replace the evaporation. This solution then gave good anesthesia in the following cases:

October 3, in cauterizing a corneal ulcer with phenol.

October 7, in applying a tincture of iodine to an ulcer of the cornea.

October 8 and October 10, in applying a one per cent. solution of mercury bichloride to an ulcer of the cornea.

October 28, in the removal of a foreign body from the cornea.

October 29, in curetting and cauterizing an ulcer of the cornea.

SOLUTION NO. V.

This half-ounce solution of cocaine muriate was purchased on November 17, 1914, and soon after used to demonstrate its anesthetic value.

December 4, it was boiled in the bottle over a gas flame for *fifteen* minutes, which reduced its volume to less than one dram; then sterile water was added to restore the volume of the solution to the full half-ounce.

December 11, two instillations, of one drop each, of this solution allowed an imbedded foreign body to be removed, without pain, from the cornea.

December 21, and again on December 31, the experience of December 11 was repeated.

Also on December 31, two instillations of this solution, with an interval of a few minutes, produced good dilation of the pupils for fundus examination, in an elderly man.

January 2, 1915, this solution was boiled as before, but for a period of *twelve* minutes, which reduced its volume to not more than 15 minims; then sterile water was added to replace the water evaporated by the boiling. This solution was then used satisfactorily in the following cases:

January 9, for exploring the upper conjunctival fold for a foreign body. January 11, in removing a foreign body from the cornea; in this case pronounced dilation of the pupil was produced. January 14, in a case of tenotomy where large dilation of the pupil was also produced.

February 4 this solution was boiled for *fifteen* minutes, when only a few minims remained; then water was added to replace the evaporation. This solution then produced satisfactory anesthesia as follows:

February 8, for cauterizing an erosion of the cornea with phenol. February 10, for the use of the tonometer.

In solutions No. 1 and No. 2 the repeated boilings greatly concentrated the solutions, so that they were finally very much more than 4 per cent. in strength. To solutions No. 3, No. 4, and No. 5 I have been very careful to add sterile water after each boiling so as to retain practically a 4 per cent. solution for use.

To recapitulate: Solutions No. 1 and No. 2 were each boiled on four occasions for periods of three minutes, making a total boiling of twelve minutes. Solutions No. 3 and No. 4 were each boiled eight times for periods of three minutes, making a total boiling of twenty four minutes. Solution No. 5 was boiled for periods of fifteen, twelve, and fifteen minutes, making a total boiling of forty-two minutes.

In no case have I failed to secure the desired anesthesia with a small amount of the solution. Also there have been no undesirable effects, such as irritation of the cornea or conjunctiva, and the

healing of surgical wounds has not been interfered with in any way.

Hence I am fully convinced that frequent or even prolonged boilings of solutions of cocaine muriate do not injure or destroy their anesthetic value, nor does it make them more dangerous to the tissues to which they must be applied in ophthalmic surgery.

350 WILLIS AVENUE.

CONGENITAL CYSTS OF THE NECK.*

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From the scantiness of the literature upon congenital cysts of the neck region, I think this subject has been far too cursorily considered by the medical profession. The conditions are not so rare that we should place this as a shield for a mistaken diagnosis, and worst of all for a radical blunder in treatment, which would most surely only aggravate the existing pathology.

These are pathological conditions, which from outward appearances and clinical pictures may seem very simple, but when explored at the operating table may prove to provide one of the most delicate of dissections and perplexing of operations.

Ascheron, in 1832, was the first to discover that congenital cysts and sinuses of the neck had connection with fetal branchial clefts. A little later Roser and Koenig did some valuable work along this line, by which they proved beyond a doubt that the above discovery was correct.

In the four weeks fetus there are four branchial clefts, which correspond to the gills in the fish. The tissues separating these clefts are termed branchial bars. All these clefts should become completely obliterated, or, in other words, the arches or bars separating the clefts should coalesce (with the exception of the first cleft which forms, practically speaking, the canals opening into the pharynx), leaving the neck perfectly smooth. If nature fails in any of these particulars, there is produced a congenital cyst, a fistula, or both. In the fistula formation the opening may present itself either externally, or internally, or both.

In the fifth week of embryonic life we find a small vesicle on the back of the tongue. By the eighth week, the first appearance of glandular tissue appears. This is the developing thyroid gland, which shows attempt at secretion as early as the fourth month of fetal life. There is then a functioning thyroid gland at this stage of embryonal life, although situated on the back of the tongue.

*Read before the Sullivan County Medical Society, April 7, 1915.

The gland slowly passes down to its normal resting place through the thyroglossal duct, and this passage is obliterated behind it. Normally, nothing remains of the lumen of this duct, but when nature fails to do her duty again we have developed a congenital abnormality. If some of the thyroid cells are dislodged from the gland and remain along the duct, these may develop into accessory thyroids, which usually cause no trouble, unless they become diseased. This duct may fail to be obliterated, either partially or totally, causing the existence of a cyst or fistula. These fistulas open externally in the median line of the neck, and are termed by some "median fistula" to differentiate them from the branchial sinuses mentioned before. They are usually called thyro-glossal cysts and fistulas.

Roser classifies the conditions arising from an unobliterated branchial cleft under three heads: First, branchial fistula, when the entire tract remains patent, there being both an internal and an external orifice. Second, cystic fistula, when one end of the tract is closed. Third, branchial cyst, when the ends of the tract are closed, the intermediate portion remaining open. According to Sutton, the external opening of the branchial cysts and fistulas are usually along the anterior borders of the sterno-mastoid muscles.

These conditions, as all congenital afflictions, have no definite period for making their clinical appearance. While they usually become noticeable about the age of puberty, they very frequently are recognized by the parents in early childhood and infancy. Yet they may lie dormant for years and suddenly start up in adult life with one of three tendencies: First, to cystic formation, causing the patient to seek relief from pressure symptoms, or for cosmetic reasons. Second, to sinus formation with more or less constant discharge, which is a continuous annoyance and embarrassment. Third, to a malignant development. The size of the cysts depends upon the rapidity of the accumulation of its fluid contents, and the length of time elapsed before treatment is sought or a spontaneous fistula is established.

Why these ducts should not completely close is not perfectly clear. Some believe it is because of the inclusion within their walls, or we might say the misplacement into their walls of foreign tissue cells derived possibly from the ectoderm or entoderm, which, following the course of all such anomalies, develop later into pathological conditions.

Dermoid cysts are entities which develop in the floor of the mouth and are very easily mistaken for ranula. They may also, when developed to con-

siderable size, form a prominence below the chin in the midline. They develop very slowly and are usually painless.

Lymphatic cysts of the neck are not included by some under congenital cysts of this region. They are lymphatic cystic tumors, which may develop considerable size, even extending below the clavicle. They are usually lobulated, situated at the sides of the neck in the region of the lymphatic chains, extending at times in a neoplastic manner, invading the muscular layers and sometimes infiltrating the muscles themselves.

The diagnosis in the majority of these cases is not difficult. The occurrence of a cystic tumor in the front portion of the neck should at once cause the suspicion of a congenital condition. While small, they cause no symptoms, and sometimes may become quite large without giving any inconvenience, although others not so large may cause the patient to seek relief from pressure symptoms. They are usually hard, but may be rather fluctuant, the skin being freely movable over the tumor with no discoloration or tenderness. They seldom become infected, until an opening has been made, or has formed spontaneously. If infection occurs, they rapidly increase in size, and produce the ordinary symptoms of infection. If the purulent contents are not released by incision a fistula soon develops, which, from that period, more or less constantly discharges. They are movable in a transverse direction, but not vertically. When the diagnosis is doubtful a hypodermatic needle will demonstrate the cystic properties of the growth. If an external orifice has already formed when the case first presents itself for treatment, we may be able by passing a probe very cautiously, to locate the cyst and ascertain the size of the cavity, and possibly be fortunate enough to pass the probe into the sinus leading to the internal opening if there be one.

The treatment can be expressed in two words: total extirpation. However, this is much more easily said than done, especially when there is an internal orifice, or a sinus leading almost to the pharyngeal wall. In dealing with the simple branchial cyst, without sinus formation, the skin over the tumor is cautiously incised, being careful not to enter the cyst cavity. The entire wall is completely dissected and removed *in toto*. The wound can be closed without drainage. Should there be an external opening with sinus, the skin incision must then be elliptical, surrounding the orifice, removing with it a narrow margin of normal skin on either side, extending the incision to the desired points on either side for easy removal of the sinus

and cyst. A probe in the sinus aids in its dissection. In these cases where the contents have been allowed to partially evacuate, and the walls are more or less lax and collapsible, the dissection will be made much easier by distending the cavity with some methylene blue solution before the operation. This stains the cyst wall, making it more easily recognized.

When there exists a sinus ranging from the cyst inward, then the operation becomes very difficult and at times a total extirpation of the entire tract becomes an impossibility. In the branchial type the internal sinus is carefully dissected from the surrounding structures. Koenig follows it by blunt dissection almost to the mucous membrane of the pharynx; then with a Whitehead speculum in the mouth, he passes an eyed probe into the sinus, making it enter the pharynx. The probe carries a silk thread, which is brought out through the mouth.

The sinus is then severed a short distance from the internal orifice, tied to the thread and by pulling on the thread through the mouth the sinus is inverted into the pharynx. With two sutures it is fastened to the mucus membrane, and the redundant portion cut away. The cyst is removed and the wound closed as in simple cases.

When the median or thyro-glossal cysts are complicated by an internal sinus, the task may be difficult also. The duct sometimes passes through the hyoid bone and in order to obtain a permanent cure it must be completely removed from its bony canal, or perhaps it will become necessary to excise a portion of the bone itself.

When the walls of these cysts are very thin and closely adherent to the vessels and nerves of the neck, their removal becomes very tedious and sometimes impossible, and yet only a total dissection of the entire sac will effect a cure. If any portion of the secreting lining be left behind, the condition will positively recur. It is for this reason that simply drawing out the contents of the cyst, or following the aspiration by injections of irritants or caustics, always results in failure. If the contents are sterile at first the aspirating needle may do harm by introducing infection.

CASE: Miss M., age 15, came to the hospital Aug. 29, 1914. When she was about three days old her mother noticed some oozing from a pin point opening at the inner border of the right sterno-cleido-mastoid muscle about the junction of the lower and middle third. The opening never healed and constantly discharged a thin, whitish fluid, very small in amount. It never gave any trouble with the exception of the drainage, which required frequent use of the handkerchief to keep the fluid from trickling down the neck. A soft tumor the size of a hickory nut was found above the small orifice.

A very fine probe could be passed for an inch and a half to two inches upward through the opening, and, by rotary movement, a cavity demonstrated the walls of which were very sensitive. Before making the incision, the sac was tightly filled with sterile methylene blue solution, so that the blue cyst wall could be easily detected from the surrounding tissues in the dissection. An incision was then made over the cyst and around the sinus opening. With a small probe in the sinus, it was first freed and the dissection continued, very cautiously, freeing the cyst by blunt dissecting. At the upper end of the cyst a sinus led upward. A fine probe passed through it to its termination, which was almost to the right tonsil, and the tract was then carefully freed and removed *in toto*. The wound was closed without drainage.

FIBRO-LIPOMA.

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Notwithstanding the anatomic, histo-pathologic, and bacteriologic investigations which have been prosecuted during the last few decades, nothing particularly new has been developed concerning either the histogenesis or pathological characteristics of lipoma. However, reports of isolated cases are always interesting, especially where the neoplasm possesses unusual features, as in the example to be described herein.

Literally, lipoma signifies a strictly benign neoplasm in any anatomical situation characterized by an abnormal overgrowth (hypertrophy) of adipose tissue. Warthin limits application of the term to "circumscribed proliferations of adipose tissue which show a certain anatomical and physiological independence of the neighboring tissue, even when the latter is fat tissue." Progression in development may occur either peripherally or from different portions of the neoplasm, fibrous connective tissue being first formed, which by metaplasia subsequently becomes fat tissue.

According to the foregoing definition, the custom prevailing among authors of designating as lipomata certain neoplasms not composed of connective tissue—simply because the cells show fatty degeneration, or that the tumors contain a superabundance of fatty elements—would appear totally unwarranted. True lipomata are mature connective tissue neoplasms, *i.e.*, "the tissue of which they are composed is of the type of adipose tissue." On the other hand, however, the observation is worthy of note that other tissue elements may be incorporated within the neoplasm, *e.g.*, when fibrous trabeculae develop to such an extent that they become predominant features, the neoplasm is designated as a fibro-lipoma; with an unusual admixture of myxo-

matous elements, the term myxo-lipoma may be correctly applied; osteo-lipoma, chondro-lipoma, lipo-sarcoma, telangiectatic lipoma, and lipoma cavernosum have also been suggested as appropriate to represent other forms which possess characteristic features.

According to its manner of development the neoplasm may be single, circumscribed, lobulated, multiple, symmetrically multiple, or diffuse. In the latter type (lipoma arborescence of Müller, *et al.*), numerous ramifying branches may extend in various directions. Lipomata more frequently than otherwise develop in anatomical situations where the fat tissue is normally most abundant. They may be subcutaneous, subserous, submucous, inter-muscular; they also develop about the kidney and other internal organs, the peritoneum, joints, periosteum, pleura, tendon sheaths, meninges, etc. The most common type is essentially an elastic, lobulated, circumscribed, encapsulated, freely movable neoplasm (hypertrophy) of the subcutaneous areolar tissue; the serous, osseous, and other structures are less frequently implicated. While the majority of circumscribed and lobulated lipomata are distinctly encapsulated, this is obviously untrue in the diffuse type, particularly where the neoplasm develops beneath the pleura, the peritoneum, in the synovial membranes, etc.

The regional distribution of subcutaneous lipomata and fibro-lipomata may be mentioned in the order of their frequency as follows: the neck, back, gluteal region, thighs, axillae, anterior abdominal wall, arms, hands, feet. Strange as the observation may appear, the face and scalp are rarely implicated in lipomatous enlargement, the reason for which has never been definitely determined; and why the palmar aspect of the hand suffers more frequently than the sole of the foot also remains unexplained. Several years ago Grosch collected from the literature more than seven hundred examples of single subcutaneous lipomata, the regional distribution being: the neck, back, thigh, forearm, volar aspect of hand and foot.

In connection with the etiology, the pertinent anatomical fact must not be permitted to pass unobserved that in the embryo the subcutaneous areolar tissue is formed by "cell-islets" separated from each other by connective tissue, each fat lobule being provided with an independent blood supply. It is claimed that displacement or inclusion of these fat-forming centers is responsible for the origin of lipoma, the neoplasm being therefore congenital. Although the development of lipomata is rare before adolescent life, a few examples have been observed during infancy and early childhood, *e.g.*,

Black removed (by celiotomy) a lipoma weighing nearly ten pounds from the abdomen of a child less than two years old, the neoplasm occupying practically the entire abdominal cavity.

Even admitting the premise that lipomata are of congenital origin, there has hitherto been suggested no tangible nor understandable hypothesis to explain why in one instance there occurs "displacement or inclusion of the fat-forming centers," whereas in ten thousand others the congenital causative factor remains inoperative, and the phenomenon is consequently not produced. About the limit of pres-

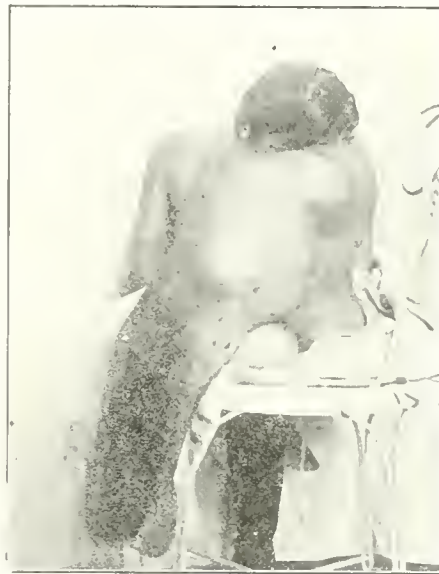


Fig. 1.

ent understanding is that "lipoblastic displacement results from disturbed embryo-genesis." This, however, merely represents a manner of expression to illustrate a well understood anatomical or histological fact, and utterly fails in elucidating the essential etiological factor, since nothing is suggested to adequately explain why the so-called disturbed embryo-genesis ensues.*

The development of lipomata is almost invariably slow, and as a rule they remain practically painless until supervention of inordinate pressure upon subjacent structures, and in the majority of instances the patient seeks medical or surgical aid for purely cosmetic reasons. Pressure from large neoplasms may sometimes induce marked pain and also serious

*The fact that lipomata have been noted in more than one member of the same family has induced the belief prevailing in some quarters that the imperfectly understood and intangible influence of heredity must be an important etiological factor. The hypothesis of hereditary influence has hitherto been vastly overworked in attempted explanation of mental, physical, and moral obliquities, the etiology of which seemed submerged in obscurity. The admission that anatomical deviations and pathological characteristics are hereditary implies that, at the time of fructification, either the ovum or spermatozoon must be similarly afflicted. The pertinent fact appears to have been overlooked that imperfect (diseased?) germ cells are incapable of being fructified; this represents one of the immutable embryological laws.

functional disturbances. Neuralgia and trophic skin manifestations have been noted in connection with multiple lipomata. Occasionally the patient complains of pain within the neoplasm, due either to the formation of new nerve fibers or because the tumor implicates connective tissue sheaths of nerve trunks. Ulceration, sloughing, infection, hemorrhage are late manifestations.

The treatment of lipomata is purely surgical. In the subcutaneous type, if operative extirpation be accomplished prior to the advent of complications (infection, hemorrhage, sloughing, etc.), there should be no immediate nor remote mortality. Since the neoplasm is strictly benign, neither metastasis nor recurrence need be anticipated. Where there exists a considerable admixture of myxomatous elements, malignant transition is not unknown. Senn states that while sarcomatous change is less frequently observed than in other benign tumors, "myxomatous degeneration of the stroma often initiates the transition of a lipoma into a sarcoma." Although Waldeyer and others claim to have noted metastasis in myxo-lipoma, the accuracy of their observations seems exceedingly questionable, and more than likely the neoplasms were sarcomata containing an unusual number of fat cells.

The statement cannot be too strongly emphasized that even the simple surgical procedure required for the extirpation of a subcutaneous lipoma should be executed under the most rigid asepsis and aseptic technic. It is of the utmost importance that the exposed surfaces be adequately protected and infection of the wound prevented, otherwise serious complications may ensue, followed by death of the patient from progressive pyemia.

In single or even multiple small subcutaneous neoplasms, extirpation may be successfully accomplished under local anesthesia; but where the tumor has attained the dimensions of the one represented by the accompanying photographs, the operation may be more satisfactorily executed with the patient under the influence of a general anesthetic. Care must be exercised to avoid laceration of the tissues, and also to secure complete hemostasis. In the majority of instances the wound may be closed without drainage.

While in the larger percentage of cases fatty tumors do not attain huge proportions, several examples of mammoth lipomata and fibro-lipomata have been encountered. According to Senn, such neoplasms weighing more than ten pounds are exceedingly rare. Among the older writers Chipault (Rötter) mentions a parietal lipoma, which attained the extraordinary length of three feet and

three inches, extending to the patient's knees. The tumor developed "in the left parietal region and was covered by the skin of the whole left side of the face and forehead; the left ear was plainly visible in the upper third of the growth."

Brander removed a fibro-lipoma weighing fifty pounds, which had progressively enlarged for eleven years. It represented an enormous mass suspended from beneath the left scapula. Rhodius records an example in which the neoplasm weighed sixty pounds. A subserous lipoma removed by Carlsberg weighed thirty-five pounds and was "partially petrified." Terillon describes a subperitoneal lipoma weighing fifty-seven pounds, and two "large

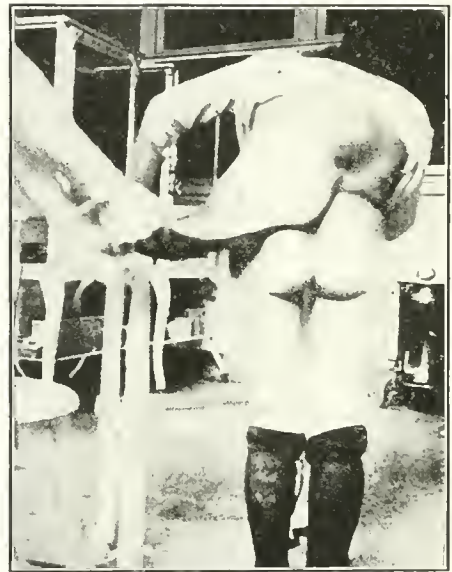


Fig. 2.

tumors" of similar type are mentioned by Homans. Meredith successfully enucleated an omental lipoma weighing fifteen and a half pounds, and Förster encountered one which weighed fifty-three pounds. Waldeyer mentions a lipo-myxoma of the mesentery weighing sixty-three pounds, and Stiegele removed a ten-pound lipoma from the vulva.*

McGuire reports the removal of a lipoma weighing twenty-two pounds from the shoulder of a colored man aged 40 years. The tumor was first noticed four years previously, and had rapidly increased in size, but had caused no pain. The wound was perfectly healed the tenth day after the operation.

More recently Little (China) reports an interesting observation under the caption of "A Spectacular Case of Lipo-Myxoma." The patient was a

*For the data concerning many of the older observations the writer is indebted to the admirable work of Gould and Fyle on "Anomalies and Curiosities of Medicine."

male of 24; neoplasm, left side of face and neck, ten years' duration, began as a small nodule below angle left jaw. Excepting for cutaneous hypersensitiveness and tension from the weight of the tumor, the patient suffered little discomfort until three months prior to operation, when several cutaneous openings occurred. He then had an enormous nodular neoplasm which had to be carried on his arm while walking, and held in his lap while sitting; several cutaneous ulcerations discharging offensive blood-stained fluid; certain areas soft and fluctuating, others hard and resistant; skin over non-ulcerating areas freely movable, the tumor apparently being only slightly adherent.

Operation revealed neoplasm adherent to but not implicating parotid gland and easily removed; weight, thirty pounds; vertical diameter, fifteen and one-third inches; horizontal diameter, eleven and three-quarter inches; circumference, twenty-four and one-half inches. Neoplasm encapsulated by loosely adherent membrane; cross section revealed cysts of various sizes, many enclosed by walls of disintegrating tissue; some contained thick greenish-brown fluid, others semi-gelatinous material; largest cyst occupied center of neoplasm; non-disintegrating portion composed of fat separated into lobules of irregular size and shape.

An extraordinary example of multiple subcutaneous lipomata in a male is reported by Broca. At the age of 25 there appeared upon the thigh a small, fatty tumor which after six years had attained considerable size. Upon excision it weighed five pounds and consisted of ordinary adipose tissue. Five months thereafter numerous small lipomata appeared upon the body surface, "fresh ones" developing from time to time during a period of forty years. When the patient was 70 years old "two thousand and eighty tumors in size from that of a pea to that of a walnut were counted over the body, more minute ones not being included." Microscopical examination of portions of the neoplastic tissue removed during life gave the appearance of lipofibroma. The patient developed dysphagia and perished from starvation. Necropsy revealed a large fatty neoplasm surrounding the esophagus, occluding its lumen, and the pylorus was similarly involved. Fatty deposits were also found in the cardiac valves, deep tissues of the neck, sheaths of the carotid vessels, etc. "It is difficult to explain such a case as this except on the ground of a congenital anomaly" (Warthin).

The following personally observed case seems worthy of record:

P. Z., female, aged 42 years, white, unmarried; height, four feet and eleven inches; weight, eighty-

seven pounds; a hunchback. Father died of senility at the age of 84. Mother died at 60 from la grippe, duration seven months; she coughed during this entire period; no expectoration; at the age of 50 was operated upon for strangulated hernia. Three brothers living and healthy. Two brothers dead, one at 9 years from pneumonia, the other at 27 from "pulmonary hemorrhage," duration of illness one year. Family history negative in all other respects.

In early life the patient had measles and pertussis; no history of any other disease. At the age of 9 years she fell from stable loft and sustained a



Fig. 3.

slight injury to her back, but did not mention the accident to her parents. She says that about a year later "a lump" appeared in the lower dorsal region, but "upon professional advice things were left to proceed at will." The patient had never menstruated, although her genitalia seemed normal; nor had she suffered any inconvenience whatsoever from non-establishment of the menstrual function. According to her statement she had always enjoyed normal physical health.

Twenty-five years ago (*i.e.*, when 17) she first noticed an enlargement just posterior to the left post-axillary fold, but as no pain nor inconvenience resulted therefrom, she made no mention of the tumor to anyone. She says that "matters were allowed to progress, and that her secret was kept because she did not confide in anyone," until November, 1913, when the tumor had attained the size shown in the accompanying photograph. About that time, when lying in bed, a sudden and copious hemorrhage occurred from about the center of the neoplasm. This finally ceased without extraneous aid, but not until the patient had become considerably exsanguinated.

This woman was brought to Louisville and came under my observation November 10, 1913. Three days later the tumor, which weighed ten and three-

quarter pounds, was removed under general anesthesia. The patient at that time was markedly cachectic in appearance. When she assumed the erect posture the tumor extended to four inches below her knees, from a point just posterior to the left post-axillary fold about on a level with the third rib. Because of the weight of the neoplasm the third and fourth ribs were separated about four inches. The tumor was nourished by one large blood-vessel, and was found intimately connected with the pleura between the third and fourth ribs. It was destitute of any definite capsule. Sloughing and hemorrhage were probably due to the weight of the neoplasm; the situation of the slough may be seen near the center of the photograph. Attention is especially directed to the length and contour of the tumor. Over the right scapula will be observed another and independent neoplasm, which was left undisturbed on account of the unfavorable condition of the patient which developed after she was placed upon the operating table. She rallied promptly from the operation, however, and convalescence progressed normally until December 13, when there occurred a slight rise in temperature, which subsided within three days. A more marked general cachexia or jaundice later ensued, and the patient perished from asthenia January 3, 1914. No autopsy permitted; laboratory finding, fibrolipoma.

As in other lipomata involving similar anatomical situations, the patient experienced little discomfort from the presence of this large neoplasm; she merely complained of a dragging sensation from the suspended weight when assuming the erect posture. Surgical relief was not sought until sloughing and hemorrhage ensued.

The result in this case directs renewed attention to the importance of early surgical extirpation of all fatty tumors. Where the aid of surgery is invoked before complications have ensued, a favorable ultimate outcome may be confidently expected.

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SCOLIOSIS.

Backache is the most important symptom complained of, and every case of backache should be examined with the object of finding not an already developed deformity so great that a layman could detect it, but a developing deformity, with a recognition of the slightest deviation from the normal.—CHARLES OGILVIE in the *New York Medical Journal*.

THE RADIUM TREATMENT OF CANCER OF THE CERVIX OF THE UTERUS.

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The results of radium treatment of carcinoma of the cervix uteri are so promising that it is worthy of special consideration, but it is first necessary to remember the limitations of radium.

So far as is definitely known at present, the action of radium is purely local. It has no effect, adverse or favorable, in the formation of metastases. One cannot expect from it, therefore, in the present stage of knowledge, any effect on a distant secondary deposit. There may be a future in general treatment by radium, but this does not seem to lie in the administration of radium itself, but rather, as suggested in the Middlesex Hospital Reports, in the injection of radiated cancer cells, or the modification of a primary local dose of radium to produce a similar effect. Practically, therefore, local treatment can alone be considered now.

It is probable that the original idea of an almost unlimited range of action for radium rays is wrong. It seems likely that "Beta" and "Gamma" rays are effective in destroying cancer cells at a comparatively short distance. Thus, when sections of malignant tissues are examined, which have previously been irradiated, they show:

- (1) Near the location of the tube, a complete local destruction of all tissues;
- (2) At slightly increased distance after an interval there is a more or less gradual destruction of cancer cells with increased growth of connective tissue;
- (3) Still more distant there is only partial destruction of malignant cells, but still overgrowth of connective tissue;
- (4) Finally, one passes to a distance at which the radium has had no effect.

It has not been possible so far to measure those distances. This difficulty arises because of the large number of factors involved in radium treatment; thus, some tumors react more readily than others, in addition to which the amount of radium used, the thickness of the metal screen surrounding it, and the time of exposure are all variable factors.

When radium was first used in malignant disease it was customary merely to place it in contiguity with the tumor to be treated. It was difficult then to exhibit adequate dosage without marked local inflammation and destruction of the vaginal mucous

membrane. Tubes of radium were merely placed in the vagina, and had to be surrounded by a thick screen of dense metal—e. g., 1.5 to 2 mms. of lead or platinum, which cut off the less penetrating but more irritating rays. This reduced the active rays by an enormous percentage. Unfortunately, in their passage through metals, radium rays produce secondary irritating ones which vary in numbers roughly with the density of the metal screen employed, so the screened tube had to be enclosed in India-rubber about 2 mms. thick to cut off as far as possible the secondary rays.

Even under these circumstances exposures had to be limited to 24 hours, and then sometimes a moderately severe vaginitis would occur. With this method much amelioration of symptoms often occurred, but it was recognized that something more was wanted.

It is well known that skin and mucous membranes react the most markedly of any tissues to secondary or other irritating rays. It thus becomes obvious that instead of using very thick screens, which reduce the effective energy of the radium enormously, thinner screens could be used by employing the tissue of the tumor as a screen. Thus the rays previously cut off could act on the tumor surrounding the tube, which in its turn would screen the more distant and irritable tissues. In this way even the secondary radiation from the metal would serve a useful purpose. Moreover, an appreciable percentage of very penetrating rays are cut off by thick screens.

So radium in doses of 25 to 50 mgs. of the metal in a cylindrical screen of 1 mm. of silver (which cuts off all beta rays) were introduced into the canal of the cervix. The same exposure of 24 hours was continued and results improved. Ulceration cleared up more rapidly and a number of cases became operable.

As mentioned, however, the range of effective action of radium rays is limited and with the use of a single central tube outlying malignant processes tended to escape with little alteration. It therefore became necessary to try to produce a more even radiation throughout the tumor.

Stevenson of Dublin had this idea in view when he started using radium emanation in small steel needles, the walls of which are 3/10 mm. in thickness. He maintained that it was necessary to use the softer and more destructive rays and that this could be done by employing small doses of 4 to 10 mos. in each needle. These needles, in form like a serum syringe needle, are easy of introduction and a number of them can be pushed into a tumor very readily.

It follows, however, from the small quantities of emanation used, and the high proportion of soft rays employed, that these needles must have a very limited distance efficiency although very potent locally. Thus great care must be taken not to have the needles too near together (Stevenson recommends about 2 cms. between them) otherwise a very violent local reaction is apt to occur.

It seems, therefore, that to some extent the needles fail to produce that evenness of radiation which is desired, and although in many cases they produce very good results, their effect taken as a whole is intensely local.

I accordingly modified my practice to a combination of the older and the newer method, and employed a system which uses a strong central tube in the canal of the cervix, reinforcing its action on notable outlying malignant processes by means of the needles. This method has also the advantage of appearing to be safer.

Thus, suppose the case to be treated has ulceration of the cervical canal, much thickening of the posterior lip, and a hard mass in the left broad ligament. A tube of 50 to 60 mcs. of emanation, or a like quantity of a radium salt contained in a cylindrical screen of silver the wall of which is 1 mm. thick, is placed entirely in the cervical canal. Two or three needles are pushed into the peripheral part of the posterior lip, and two or three, according to the size of the tumor, are introduced laterally into the base of the left broad ligament. The whole series of tubes is kept in position by packing the vagina with sterile gauze. After 24 to 48 hours the tubes are removed. The vagina is douched once or twice daily for six weeks afterwards to prevent the possible formation of adhesions.

The small sharp platinum tubes of 0.3 mm. wall thickness, as used at the London Radium Institute, may be employed in the same way as the needles. They have a greater range of action, but need much more emanation, and are more difficult to introduce.

It would seem that the above method produces better the even radiation desired, and distant troublesome foci are effectively dealt with.

It has been stated above that at present only the local action of radium can be used, and although every effort must be made to make the local effect of the rays as wide as possible, nothing can be done for secondary abdominal glands. This leads the way to taking a wider view of what should be done in all cases of inoperable carcinoma of the cervix. Unless the surgeon has grown pessimistic about his results, radical amputation of the uterus should always be performed when possible.

It is, of course, only to be expected that these cases which are just beyond operation should do the best with radium. Some patients whose disease is much more advanced, however, respond in a remarkable manner, while some, not apparently so hopeless, do not improve so much.

It is difficult to find a reason for this discrepancy. It may be said that in some patients the resistance to cancer is greater than in others, and that their connective tissues respond more readily to stimulation and rapidly takes up the work of repair. This may certainly be a factor because it is notorious that radium is much the least happy in its results when the tumor to be treated is situated in the midst of dense old scar tissue, or is adherent to bone, with or without damaged skin stretched tightly over it. In these cases the tumor does not do well and the absence of tissue that can adequately repair defects seems to be the important factor. Thus, a carcinoma of the cervix of great bulk may in effect present these adverse features.

The histology of carcinoma of the cervix is well known to be a difficult study, but its further elucidation might easily be the key of the problem. For, on the whole, those cases of carcinoma of the neck of the uterus which have their origin in the canal and extend chiefly through the thickness of the wall laterally and downwards, even though they form large polypoid growths, seem to respond best, although exceptions to this rule appear to exist. These may be glandular carcinomata even though they may have a tendency to change their form in the vagina.

The type of cancer of the cervix which responds least to radium treatment is that which rapidly grows on to the vagina, and forms a deep ulcer with a high infiltrated edge or invades quickly the greater part of the vaginal wall and makes its upper part or the whole of it a hard, rigid tube. Such cases as these, although there are again exceptions, may hardly even show the ordinary improvement of decreased vaginal discharge and fetor and the stoppage of bleeding and pain.

Fairly frequently in the course of radium treatment a cancer of the cervix seems to disappear almost entirely or an inoperable case looks clearly to have become operable. What line of treatment is it then advisable to take? After two or three treatments with radium it is usually possible to predict what further progress is likely to accrue from the same agent at the site of application. It must then be borne in mind that the object of the physician or surgeon is completely to eradicate the disease. If a secondary deposit, palpable or impalpable, exists in the abdomen, treatment so far has only been

palliative, although it may have been successful to a remarkable degree. The rational thing to do, therefore, although unpleasant to the patient, is to open the abdomen in every hopeful case, and proceed as circumstances direct. This counsel of perfection has to be modified somewhat in practice.

The patient may feel perfectly well and reject all experienced advice. This advice cannot be pushed too far because the patient may really be quite free of the disease. Moreover, should some of the cancer or secondary deposits remain, it may be extremely difficult to remove them. After radium treatment there is commonly formed around the lower part of the uterus and cervix a girdle of dense fibrous tissue which renders the separation of the uterus from the bladder and the dissection out of the lower parts of the uterus a very difficult matter. It may also be found impossible to remove glands in certain situations. Nevertheless, abdominal section should be performed when there is the slightest chance of removing the disease completely. If on opening the abdomen there are growths quite impossible of removal, tubes of radium, adequately screened, may be buried in them for from 24 to 48 hours but, unfortunately, radium dosage is not yet sufficiently well worked out that one can be sure of removing a growth at one treatment, and repeated laparotomy is not tolerated by patients as a rule. General irradiation of abdominal glands by varnished plates of radium screened by 2 mm. of lead and protected against secondary radiation, placed over the abdominal wall for 24 hours is of little real use.

If the metastases be in the liver the case is best left to its natural termination.

Improvements in technic and increase of knowledge give great promise for the ultimately successful treatment of carcinoma of the cervix of the uterus by radium.

IGNORANCE OF CANCER SYMPTOMS.

If our people are dying because they do not know, we, the doctors, must teach them. We must teach a woman that a lump in the breast, no matter how small or how painless, may be the starting point of a serious condition and must at once be investigated by a competent physician. We must teach women that irregular vaginal bleeding, the onset of a discharge, etc., may be early warning symptoms of cancer of the uterus. We must teach all people that a mole or a wart which begin to grow, bleed or ulcerate is a danger sign that must be heeded at once. There are similar early signs in other portions of the body that may forewarn people, and of which they should have accurate knowledge.—*Penn. Med. Society Cancer Commission.*

CANCER OF THE PENIS: REPORT OF TWO CASES.

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In a clinical experience of some two thousand cases of cancer in various portions of the body I have met with but four patients in whom the disease was situated in the glans penis. Each of these were instances of epithelioma.

Of the four cases, two were merely examined by the present writer, one patient declining treatment and the other being seen in consultation before a knife operation by a colleague. In the latter of these two cases, a typical instance of warty epithelioma, amputation of the whole organ, including the penile crura, was quickly followed by recurrence and regional extension.



Figure 1. Case II. Before ionic operation.

The remaining two cases, related below, were placed under the zinc ionization method with excellent results. The history of these two cases shows that the disease appeared in one in the scar of an operation for phimosis performed ten years before, and in the other possibly in the scar of a chancre for which the patient was treated 42 years before. The etiological connection between the scars and the new growths is probably remote in both cases.

These two patients represent an early and a late stage of epithelioma of the glans, the late stage including dissemination to a lymphatic gland in the groin. They illustrate the technic of the surgical application of zinc ionization in both stages.

CASE I: Farmer, aged 50, married 26 years, was referred by Dr. Campbell, of East Smithfield, Pa.,

September 22, 1912. His family history was negative and general health excellent. Syphilis and gonorrhea denied. He had, however, suffered from phimosis since childhood until operated on for this condition ten years ago, the adherent prepuce having been removed from much of the surface of the glans, including the site of the present growth.

In November, 1911, while in Florida, he noticed an itching lump near the frenum, caused, he thought, by the bite of a mosquito. The lump failed to disappear and has grown steadily since, particularly during the last six months. Examination revealed a normal organ except for an elevated, hard, whitish growth near the frenum measuring 2 by 1½ centimeters.

The patient being averse to general anesthesia, satisfactory local anesthesia was carefully induced by injections of a 2 per cent. solution of quinine and urea hydrochloride, and bipolar ionization with the zinc ion was carried to the point of total destruction as follows: Six fine zinc needles were inserted immediately beneath the growth, pointing



Figure 2. Case II. After separation of sloughs and healing of penis, but showing living inguinal gland.

concentrically, connected with the positive pole of the direct current, with a small negative electrode pressed against the center of the growth; and with all electrodes immovably in place a current of 50 milliamperes was gradually turned on and maintained for 52 minutes. On separation of the devitalized tissue the wound healed promptly under dressings of dilute zinc oxide ointment without narrowing of the meatus. The patient was seen seven months later with a soft, healthy scar and no sign of disease.

CASE II: Farmer, aged 66, referred by Dr. C. L. Clover, of Clarion, Pa., November 10, 1914. He had always been well except for a sore on the frenum 42 years before which a physician pronounced a chancre. He married later and has had seven healthy children. Two and a half years ago he noticed a white spot on the glans penis. It grew

steadily worse until the whole of the glans was involved, as shown in Figure 1. The carcinomatous mass includes the whole of the glans, but has not extended beyond the neck. In the left groin, however, an enlarged inguinal gland was found, about the size of a small marble.

On November 11, 1914, he was placed under ether and a major bipolar ionization done, with a technic similar to Case 1 except for larger electrodes. A current of 300 to 700 milliamperes was employed for 25 minutes, completely devitalizing the growth up to the neck of the glans. The carcinomatous gland in the groin was now grasped with the fingers through the overlying tissues and an effort made to pass electrodes through the skin and beneath it. With a small negative pole on the skin over the gland 600 milliamperes was turned on in this situation for ten minutes.

In the after-treatment special preparation was made for the control of secondary hemorrhage should it develop, but the slough separated at a point that included all disease, without incident, and

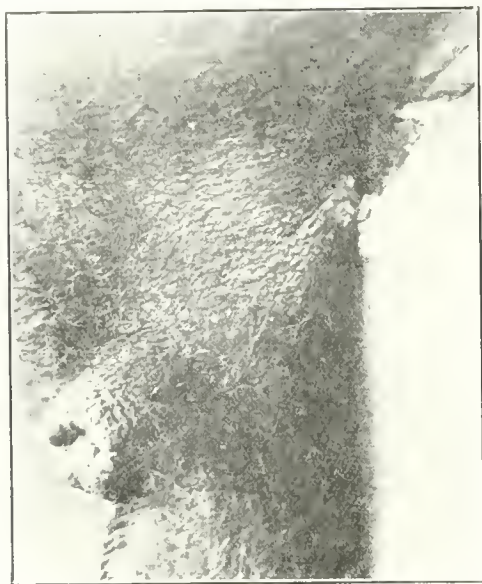


Figure 3. Case 11. One month after operation. Inguinal wound not yet healed.

also quite painlessly, and the skin edges united under the free use of diluted zinc oxide ointment without further attention. Some concern was felt as to possible narrowing of the new meatus and arrangements were made to insert a catheter, but this was found not to be necessary.

The second photograph was taken November 24 and shows the wound at the end of the penis well healed and healthy. In the inguinal wound the exposed, still living gland is also shown, it having escaped inclusion in the operative ionization. This was readily destroyed at this time by a minor monopolar application without anesthesia, 90 milliamperes being used with three needles for half an hour. The third photograph shows an apparently healthy

wound, which later healed nicely. The patient reported freedom from recurrence six months later.

1823 WALLACE STREET.

A NOTE CONCERNING THE SURGICAL RELATION OF THE BLOOD SUPPLY OF THE TERMINAL ILEUM.

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During an operation on a very large ventral hernia with intestinal obstruction and beginning peritonitis, the intestines adherent to each other and to the sac, I found that in freeing the terminal ileum and cecum, I had also separated the last five inches of the ileum from its mesentery.

Since the operation had been long, I feared a resection of the intestine which seemed indicated. The books on intestinal surgery advise: If the small intestine is separated from its mesentery it should be resected, for the arteries of the small intestine are terminal vessels and do not anastomose as do those of the large intestine.

But, I remembered, the blood supply of the terminal ileum is similar anatomically to that of the large intestine. The ileo-colic artery comes off the right side of the superior mesenteric, anastomosing with the terminal or ileal branch of the superior mesenteric to form the ileo-colic loop, which supplies the terminal ileum, cecum, appendix and part of the ascending colon. The vessels supplying the terminal ileum anastomose with each other, so if the ileum is here separated from its mesentery it will be nourished by the vessel anastomosing along the gut.

I therefore sewed the terminal ileum to the torn mesentery with success. I do not believe it was nourished by the omentum, as is reported by one experimenter, who found that in dogs the small intestine could be separated from its mesentery for two inches, if wrapped around with omentum.

That the blood and lymphatic supply of the terminal ileum are the same as that of the ascending colon, is well recognized in operations for carcinoma of the cecum, and it is removed with the cecum and ascending colon in these operations.

February 6, 1911. Mrs. C., 46 years old, mother of one child, was operated on two years before by another surgeon, for pelvic abscess—laparotomy and tube drainage, through the median abdominal incision.

Hernia in the incision followed. The patient came to me suffering with severe pain in the right side of the lower abdomen, which had lasted a

month and was getting worse every day lately. The pain was made worse by eating, which was followed by great distension of the abdomen. Seven days before, there occurred vomiting, severe pain before the bowels moved, and chills followed by fever. Temperature 102°, pulse 110.

The hernia was a large one in the scar through the right rectus near the median line. It was irreducible and very painful on pressure.

Diagnosis: Post-operative ventral hernia with intestinal obstruction and beginning peritonitis.

Operation: The abdomen was opened by transverse incision. The sac, the size of a large grape fruit, was filled with cloudy fluid and intestines, in places covered with small flakes of whitish lymph, and adherent everywhere to each other and to the sac. The hernial ring was two and a half inches in diameter. With great difficulty the intestines were separated from the sac and returned to the abdomen. The terminal ileum which had been separated from its mesentery was sewed as described above. Hernia repaired by overlapping from above downward. Lipectomy.

The patient has remained well ever since.

220 WEST 98TH STREET.

SKIN CANCERS.

In reviewing many histories of superficial cancer one is struck by the apparent sameness of the account given by the patient. An old lump, wart or mole may have existed for years and caused no trouble; a year ago, following possibly some irritation, it began to grow; six months ago it began to ulcerate, or possibly a slight discharge may have been observed; the usual ointments or ducting powders have been applied, but the irritation increases, or the ulceration becomes larger; the general health may be as good as usual, and very little or no inconvenience has yet been noted. But the patient is now getting uneasy and seeks advice in the matter. By this time it has ceased to be an early cancer.—CHRISTIAN LONGENECKER, in the *Pennsylvania Medical Journal*.

CANCER OF THE CERVIX.

The importance of early diagnosis of cervical cancer is so urgent that, when called upon to treat a lesion of the cervix, carcinoma should always be thought of first and excluded from the diagnosis. The signs and symptoms of cancer of the cervix are so few that a hurried and superficial examination of any suspicious condition should never be made. If there is the slightest doubt, the diagnosis should be reserved and the patient kept under careful observation. Too often we are told by the patient that an examination had been made by her physician, but the condition was treated lightly and repeated examination was not insisted upon—E. A. WEISS, in the *Pennsylvania Medical Journal*.

UTERUS UNICORNIS—A CASE REPORT.

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Kratzmeyer and Gilpi¹ found in 1,000 cases examined five of abnormal development of the sexual organs. These abnormalities are often associated with urinary or hindgut irregularities also.

Radish² has collected 255 cases of absence of the kidney, 100 of which showed defects in the genitalia; of these, 40 occurred in males.

Deformities of the female generative organs may be divided into three groups:



Fig. 1. Specimen of uterus unicornis with hematometra. The upper body is the uterus; the constriction is at the level of the internal os uteri. The lower body is the dilated cervix. The probe at the left is introduced into the single (left) uterine artery.

1. Absence—failure of the embryonic structures to develop at all.
2. Fusion abnormalities—failure to complete their development.
3. Reversion to an earlier type.

The internal genitals spring from two separate embryonic structures: the ovaries from the Wolffian bodies; and the tubes, uterus and vagina from the ducts of Mueller³.

Although fusion of the two kidneys is a well-recognized abnormality, I have been unable to find in the material at my command any recorded instance of fusion of the ovaries. So congenital deformities of the ovary would seem to be more or less restricted to absence, incomplete descent or reversion to a lower type.

In tubo-uterine and vaginal malformations the field is broader owing to the fact that the partial fusion of paired tubes is necessary for their complete

development. Kerr¹ says that uterus bicornis is probably the most common form of fusion abnormality. As examples of these forms of congenital malformation are uterus bicornis, uterus bicornis unicornis, uterus septus, uterus subseptus vaginalis, uterus didelphys, uterus pseudo-didelphys.

Uterus unicornis, while it is a fusion abnormality, is characterized by the complete absence of one of the ducts of Mueller, its fellow carrying out its part of the program more or less completely.

Atresia is more difficult to explain, for we except these cases which are, or may be, due to intra-uterine or early extra-uterine inflammations, and the subsequent partial or complete obliteration of an already formed canal.

That such an inflammatory condition could have occurred in the case reported might possibly explain the vaginal condition only.

Edna C., white, American, aged 15 years, of healthy parentage, was seen by me first a few hours after birth, with Dr. Charles F. Ginn, who had made a diagnosis of atresia ani vaginalis. She was then operated upon successfully, and though no sphincter ani fibers were found, she has had little trouble with her artificial anus during these years owing largely to the fact that she has been constipated.

Childhood was uneventful until one year ago, when there developed pelvic and left-sided abdominal pain in four to six-week periods, unaccompanied by any menstrual flow.

The intense pain led to the discovery of a tense, globular, tender tumor in the left pelvis and reaching as high as the costal margin. A diagnosis of ovarian cyst was made.

At operation an unadherent, multilocular, left ovarian cyst was found and easily removed. No Fallopian tube and only a rudimentary broad ligament could be demonstrated on this side. The round ligament was normal. On the right side no trace of ovary tube, broad or round ligament was found. The uterus was normal in size so far as the fundus was concerned, but it merged into a small egg-shaped cystic swelling at its junction with the neck.

Closing the abdomen and examining the patient in the lithotomy position, I found the external genitals normal, the hymen present with large circular opening, a shallow depression just posterior and simulating the vagina, which proved to be the remnant of the ani vaginalis. There was complete vaginal atresia. Scissor dissection carried upward in the fibrous plane between rectum and vagina was unable to reach the cervical tumor.

Two weeks after returning home, she had the same type of menstrual pain as before operation. At the next proper period for menstruation pains became so severe as to require morphine; there was a continuous temperature of 101°, and a tumor was found as large as and in the same location as the former one. Associated with this were nausea, vomiting, and constipation.

Incision was made beside the left rectus scar of the previous operation. On walling off the intestines a large sausage-shaped tumor presented itself, starting from the median line at the level of internal os and curving toward the left until its fundus rested underneath the costal arch.

The small, globular cervical mass noted at the former operation had increased in size until it was 7.5 c.m. in diameter and 10 c.m. in length.

The contents of the hematometra was thick, tarry blood, 300 c.c. in amount, the last part being mixed with ropy mucus.

The peritoneum was stripped off the anterior and posterior surface of the uterus, beginning at the constricted portion between the neck and the body,



Fig. 2. Uterus unicornis opened on its anterior surface. The sutures are at the internal os; it was amputated at this portion to facilitate removal during operation.

having previously packed the cavity with gauze. The whole mass was enucleated with little active hemorrhage.

The anomalous condition of the blood supply was interesting. There was but one ovarian artery, the left, which was ligated at the first operation, and one uterine artery, the left. This artery, which sprang from the external iliac at its usual location, entered the uterus on its anterior surface almost in the median line between the bladder and uterus at the level of the internal os, and was as large as the radial artery in the adult.

Uterus unicornis is one of the rare types of uterine congenital malformations. The reported case evidently belongs to that type, inasmuch as there were but one round ligament and one uterine artery, and because of the embryonic position the uterus assumed when distended.

Hysterectomy offers the safest and surest means of relief in hematometra uterus unicornis associated with atresia vaginalis.

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A CASE OF SARCOMA OF THE
CONJUNCTIVA.*

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J. H., male, white, aged 60 years. The tumor was first noticed three years before coming under my observation, as a small mass located on the conjunctiva at the corneo-scleral junction to the nasal side. It had developed rather slowly, causing but little inconvenience other than bleeding, which was easily provoked.

At the time the patient came under my observation the neoplasm extended well forward between the lids and prevented their closing. The conjunctiva was markedly injected, and much pus was present in the conjunctival sac. The vision could not be taken, nor could it be determined whether other structures than the conjunctiva were involved, as the mass covered the cornea, although it seemed to have a relatively small base.

Immediate operation was advised, to which the patient consented. The neoplasm was readily dissected from the conjunctiva, and while the appearance and character of the growth, etc., led me to believe it was malignant, the precaution was taken to have a section examined while the patient was still under the influence of the anesthetic. Dr. J. D. Allen, of the Louisville Research Laboratory, kindly made the section, and pronounced the growth sarcoma. Enucleation of the eye was then performed.

Laboratory findings: Macroscopically, tumor about the size of a pecan, irregular in shape. Cross sections present a pale white glistening appearance. Microscopical sections show a pronounced proliferation of spindle large and small round cells, also quite a number of tumor giant cells. The stroma is rather scanty, composed of connective tissue, with some round cell infiltration. Mixed cell sarcoma.

The operation was performed September 14, 1912, and in a recent communication the family physician states there has been no evidence of a recurrence.

Parsons states that sarcoma of the conjunctiva occurs most commonly at the limbus as an epibulbar growth, and that the first case was reported by Baumgarten in 1852. Since then but eighty cases have been recorded. These tumors are usually pigmented.

It is further stated by Parsons, from whose book I shall quote freely, that pigmented connective tissue cells are sometimes found at the corneal margin,

and are often the starting point of malignant growths. Such neoplasms are sarcomata, and must be distinguished from malignant tumors originating in congenital nevi which must now probably be regarded as carcinomata.

The tumors may appear as black, brown, or red, smooth, round elevations, or nodular masses. The corneal stroma is not usually invaded, or at most the superficial layers only. In Wadsworth and Verhoeff's case the anterior third was infiltrated, but the whole may be involved in the latter stages. Increase in growth takes place principally in the conjunctiva, so that the tumor can still be moved over the globe. Accounts show that these neoplasms develop slowly, requiring about a year to become the size of a pea or a bean. The patients are usually old, but Krautner, Benson, and Schultze report cases at 8, 11, and 14 years, respectively. The average age of the patient is 51 years.

The general opinion as to malignancy is voiced by Verhoeff and Loring, who regard such neoplasms as highly malignant, judging by their tendency to recur and form metastases. Of the thirty-six cases on which they report recurrences, metastasis occurred in eight, and recurrence in lids and orbit in four others. The consensus of opinion is that they are extremely malignant and should be treated by radical methods. (Primary enucleation.)

Microscopically, sarcomata of the limbus show few peculiarities. They are usually round or spindle celled, the cells being of various sizes in different cases, and generally arranged in bundles.

Penetration of the globe in these cases is extremely rare, although it does occur, according to Kerschbaumer; the growth then passes along, perforating the anterior ciliary vessel. The intra-ocular invasion is never extensive. Invasion of the cornea is always at first between Bowman's membrane and the epithelium.

Sarcoma involving other parts of the conjunctiva is very rare. One case has been published by Griffith in which the tumor occurred in the upper fornix; in another it arose at the inner angle in the socket of an enucleated eye.

CHOLECYSTITIS.

Non-calculous cholecystitis seems occasionally related to a diseased appendix or to inflamed hemorrhoids. As a considerable period of time may intervene between the original disease and the cholecystitis, the connection is not always determinable except at operation or at autopsy.—DAVID REISMAN in *The Therapeutic Gazette*.

*Clinical report before the Louisville Eye, Ear, Nose and Throat Society, May, 1915.

COMPLETE TORSION OF THE GREAT
OMENTUM.

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The case herein recorded is the second instance of torsion of the great omentum on record in which the diagnosis was made before operation and thereupon proven; the first case correctly diagnosed is credited to Rudolph of Prague.¹

Torsion of the omentum, in spite of the number of cases that have been reported in recent years, is still an uncommon surgical condition. The first case was described by Oberst in 1882, the second by Demons, five years later. Bayer, Monod and Eiselsberg each recorded a case and with each year more cases were put on record until, in 1907, Lejars was able to tabulate 66 instances of this surgical curiosity, as it then was. In 1910 Balduin collected 78 cases from the literature, and in 1913 Armstrong² increased the number to 120, since which time Patel and Santy³, Cinaglia⁴, Fritsch⁵, Lejars⁶, Pentz⁷, and Morestin⁸ were each able to add one case to the rapidly growing list and Thevenard⁹ mentions four cases, so these with the author's bring the list up to about 131.

This condition occurs in two types, acute and subacute. It has been subject to various attempts at anatomical classification by Corner and Pinches¹⁰, Patel and Santy (*loc. cit.*). Payr (quoted by Mueller¹¹, after a study of the reported cases, suggests that torsion may be divided into the following:

1. Torsion without coexisting hernia: (a) simple cases involving the omentum only; (b) complicated cases involving other adherent abdominal organs.

2. Torsion with pre-existing hernia: (a) intra-abdominal torsion without involvement of the hernia; (b) intraabdominal torsion with involvement of the hernia (strangulation or inflammation); (c) omental torsion within the hernial sac only; (d) complicated cases: 1, both intraabdominal and hernial twisting; 2, either intraabdominal or intra-hernial torsion associated with a retrograde incarceration.

This classification while seemingly cumbrous, covers every type of reported case. The type most common is the intraabdominal torsion with involvement of the associated hernia by either strangulation or secondary inflammation. Corner and Pinches found that 75 to 80 per cent. were of this variety and but 10 to 12 per cent. each of the hernial or abdominal type.

The mechanism involved in the production of this very unusual condition is but little understood except for the fact that in the preponderance of cases there is an associated hernia, either external or internal, or an adhesion to some structure whereby the omentum becomes fixed thereby acquiring a pivotal point. The omentum itself is but little changed pathologically except for a congestion of varying degree or an anemia that may go on to complete gangrene with perhaps an extraneous infection, usually hematogenous, in the long existing cases. In some of the long-standing cases the omentum was found to be completely gangrenous due to the complete cutting off of the blood supply from the twisting of the pedicle; just short of this, thrombosis of the vessels may occur with the liberation of emboli to lodge in the various organs, especially the lungs.

Of factors having an etiological bearing on this condition many have been enumerated, among which are: malignant and tuberculous implantations in one form or another which have acted by virtue of their added weight in bringing about and accentuating the torsion, appendicitis, pelvic inflammations, anomalous membranes and folds of peritoneum and, as previously mentioned, inflammatory adhesions and herniae.

As a natural result of the fact that herniae occur more frequently in males than in females, omental torsion has been found twice as often in the former as in the latter and usually between the ages of thirty and fifty. In a series of 24 cases Rudolph found 16 associated with a right inguinal hernia and 5 with a left; while Corner and Pinches in a series of 53 cases showed that of this number that were associated with a hernia there were 33 on the right side and 9 on the left. It thus will be seen that the existence of a hernia, usually for a number of years, has more than an incidental bearing in the production of this condition; in fact Lejars states that 90 per cent. of these cases have their rather common defect as the latent factor in bringing about the condition.

Given, then, an old hernia with a tab or a larger piece of omentum adherent to the interior of the sac or caught in its neck, one of the conditions found in the vast majority of the reported cases is fulfilled, namely, an abnormal fixed pivotal point usually at the periphery of its distal end. This is also exemplified by an adhesion to the parietes or some adjoining organ, thus creating a hammock-like arrangement, the upper end fixed by the normal attachments of the omentum and the lower by this abnormal restraining area. Having established this latent factor, there is only lacking the

impulse, whatever it may be, to start this hammock swinging and precipitate a crisis.

It has been shown by Rubin¹² that the omentum is devoid of independent motion and that its seeming ubiquity is dependent upon intestinal peristalsis, intraabdominal tension, static conditions of the stomach, colon and small intestine and the anatomical relation of the omentum to the gall-bladder and spleen; and as these factors are normally inconstant, the actual impetus that brings about the beginning rotation will still remain in doubt.

The actual state of affairs may be likened to that of a flag swinging from a pole in the breeze, its lower end caught on an adjacent nail or twig. A hammock-like arrangement is thus produced and with the wind continuing interruptedly, the flag wraps about itself, so to speak, and a tightly twisted mass is the result—a rotation of the central portion and turns in opposite directions at the poles. While normally the omentum is idly moved about by the factors mentioned above, when a fixed pivotal point is introduced and the motion is kept up, the hammock-like arrangement is accomplished with the possibility of a resultant torsion. As has been previously stated, the actual impetus to bring this about will remain in doubt, as an enormous number of our abdominal cases operated upon for entirely alien symptoms and conditions, have herniae and adhesions present undoubtedly for a number of years without omental torsion. So with the small number of cases reported, the actual torsion must be looked upon as an idiopathic accident.

Symptoms—The active symptoms occur only when there is interference with the blood supply.

In the acute type at the onset there usually occurs some degree of pain, continuous in character, but this may be cramp-like if there is an associated ileus. Over the lower abdomen the muscle spasm is invariably distinct and later, with the edema due to the venous obstruction and the torsion, a mass may be mapped out with poorly defined margins and dull on percussion. Vomiting, rarely blood-stained, occurs in about half of the cases. Obstipation is also seen in about half of the cases, but where the twisted upper pole encroaches on the transverse colon, mechanical obstruction may occur to a more or less degree or there may be blood and mucus in the stools from the stasis, as in our case. Ascites is rarely present.

In the cases where the torsion is in a hernial sac alone, the symptoms of a strangulated hernia supervene; in fact all the symptoms are present except the continuous vomiting with its gradual transition to an enteric character and the attend-

ant change in the pulse and general condition of the patient. These cases are no doubt more common than is supposed but are treated as simple incarcerated omentoceles.

In the cases of the intraabdominal variety with involvement of the associated hernia, occasionally all the symptoms stated above are present in addition to the abdominal tenderness, muscle spasm or rigidity. Corner and Pinches found that in one series 14 had pain in the hernia only, 17 referred their pain to the abdomen, 7 had pain in both localities, 11 in the right iliac fossa and 1 in the region of McBurney's point. In the cases giving a clear history, the diagnosis of this type ought to be made more frequently and no doubt will be as soon as the connection between the hernial and abdominal lesions is better understood.

In the purely abdominal cases the diagnosis is of course nearly impossible, for with or without the scar of a previous operation and the onset of an acute abdominal crisis, the diagnosis of an incomplete intestinal obstruction due to adhesions is most apt to be made, if any definite one is made at all.

In the subacute type, the symptoms are of a milder degree and longer duration than those of the acute type. The most prominent symptom is pain, either in the region of the upper pole as in our case, or in the hernial sac if one is present or at the site of the lower pivotal point. Vomiting may be present and there may be some signs of obstruction of the bowel, but these symptoms do not persist for any length of time, although recurrences are very common.

Mrs. A. J., No. 48,853, age 49, was admitted to Lebanon Hospital in the service of Dr. Parker Symms on January 31, 1915, with the following history: Has had a right inguinal hernia for 21 years which has gradually increased in size. Has worn a truss for the past two years. During the last four months the patient has had indefinite pains, sharp and cramp-like in character, in the left lumbar region and to a lesser degree in the right groin and in the hernia itself. These pains would persist for a few days and then disappear, to recur in a week or two, and have gradually become worse during the last four or five weeks. Her present illness dates back four or five days before admission when she was seized with these pains in the back, groin and hernia; her discomfort then continued without cessation up to the time of her admission. She did not vomit but felt nauseated when the pains were most severe. Appetite poor and bowels regular for the first two days of her illness, but on the second day the patient noticed a mucous stool mixed with blood; another movement of a similar character was observed on the day of admission. Has had "fever" and chilly sensations for the last day or two. Lately she has

had to get up four or five times a night to urinate. Temperature 102°; pulse 120; respirations 30.

Physical Examination—Head, neck and chest, negative. Abdomen symmetrically distended. Moderate-sized inguinal hernia present on the right side which is irreducible and very tender. Abdomen markedly tympanitic. Acute sensitiveness over the entire abdomen, with special points of tenderness under the left costal margin and also in the right lower quadrant; in this last area there is considerable muscular spasm and rigidity and the distinct outlines of a large mass, ovoid in shape, the upper pole fading gradually to the left and the lower seemingly merging into the inguinal canal. Diagnosis made of torsion of the omentum.

Operation—Right lower rectus incision. Considerable sero-sanguinous fluid escaped when the peritoneum was opened. Omentum found, very dark in color and its lower end wedged in the right internal inguinal ring, from which, after considerable manipulation, it was extracted; this portion thus liberated was almost black and about to slough. The upper part of the omentum was then inspected and close to the splenic flexure of the colon it was found to be twisted into a tight cord, about two inches in diameter. Untwisting this, it was found to have rotated almost twice. This pedicle was transfixed and tied off and the omentum was removed. The sac of the hernia was adherent to the surrounding structures and it was not possible to invert it into the abdomen for removal. As the patient was somewhat shocked, the internal ring was closed with several Pagenstecher sutures of linen, care being taken to avoid the deep epigastric vessels. The abdomen was closed in layers without drainage.

The temperature fell to normal soon after operation and with the exception of a slight phlebitis in a varicose vein in her left leg, the patient made an uneventful recovery and was discharged cured on February 14, 1915.

The specimen showed a greatly congested omentum in its entirety with a number of thrombosed veins and a beginning necrosis at its lower pole (the part that was in the sac) and at its upper extremity were a number of bands of scar tissue, presumably due to old twists that fashioned this portion into a stout cylinder. There are some good illustrations of this condition in Keen's Surgery Vol. VI, pages 515 and 564.

The case at first presented considerable difficulty in trying to correlate all the physical signs, but the history of a troublesome hernia coupled with the mass above this irreducible rupture and the acute tenderness in the region of the splenic flexure, after some consideration explained themselves in this wise: the lower pole of the omentum was caught in the hernial sac, which acted as its lower pivotal point, while the tenderness beneath the left costal margin arose from the upper pole where it had reciprocally twisted. It is only fair to state

that I had the good fortune to recall a case that had been shown at the New York Surgical Society by Dr. Syms in April, 1911¹³, which, although it was totally dissimilar in many respects, being complicated by an acute suppurative pancreatitis and intestinal obstruction.

The second area of tenderness under the left costal margin, as was present in our case, seems to have been overlooked or was not complained of by the patients in the majority of the articles dealing with this subject, but as the omentum *must* have an upper reciprocal pivotal point in *all* cases it is rather surprising that it is so scantily dealt with; Armstrong, however, states that in his case there was tenderness under the right costal margin. Connecting the troublesome hernia below and the other site of pain in the left lumbar region above the structures to be thought of would be either the omentum or the intestines, but as there were no signs of obstruction and a distinct mass was felt, the omentum seemed to be the logical link.

The old bands of scar tissue in the region of the upper pole showed that with the pain the patient had had in the past, and probably the cause of it, was a slight torsion of the omentum that relieved itself and caused symptoms of the subacute type at these times.

The history of having passed blood and mucus twice was explained by the fact that where the upper pole of the omentum was twisted close to the splenic flexure of the colon there was considerable congestion of this portion of the bowel which caused some "weeping" of blood into its lumen and its appearance in the stool with mucus.

Treatment—The only treatment of this condition is operative. The usual procedure when the case is associated with a hernia has been to make the primary incision over the hernia directly and, with the recognition of the exact state of affairs, to trace the omentum upward if the ring is large enough or to make use of a second incision through the abdominal wall for further inspection and manipulation; but if the diagnosis is presumed at or made definitely the primary abdominal incision is best as it brings one down to the site of the trouble at once. In some of the cases the torsion was relieved and the omentum replaced without removal, but this is of course only applicable to the cases that come to operation early. From what we know of the fate of placing parasitic omental grafts and their questionable value it seems to us that it is wiser in even a doubtful case to ablate the omentum above the twisted upper pole to obviate the pos-

sibility of the omentum sloughing as a whole or in part and to prevent a likely recurrent torsion at a later period. Unless there is distinct gangrene the abdomen may be closed without drainage in the uncomplicated cases. In passing, it is interesting to note that Morestin in his case made use of ether lavage before closing the abdomen.

Should the hernia not be attacked directly, the sac may be inverted and tied off from within the abdomen and failing in this the ring may be closed with non-absorbable sutures from the interior as we did in this case and have done in others of a different nature.¹⁴ Should any trouble arise from the empty sac, a simple incision under local anesthesia may be made and suture of the sac to the skin and packing, as in a Volkmann operation for hydrocele. If the hernia persists, a radical operation may be done at a later date or, what is better still, if the patient is not jeopardized, this may be done at once.

Prognosis—Nearly all of the uncomplicated cases have recovered, the mortality being in the neglected or long-standing ones that have come to operation very late and have had other conditions added to the original one. According to Van Hook and Kanavel¹⁵ the mortality is about 90 per cent., while Mueller places it at about 84 per cent., but as the condition is better understood and recognized the mortality should be no higher than any other acute abdominal torsion that is recognized early and submitted to operation. In the cases associated with a hernia which shows symptoms of incarceration, the prognosis is somewhat better as these cases are usually viewed, at least tentatively, as hernial crises and subjected to early operation at which time the real condition was recognized and treated accordingly.

In the purely abdominal cases where an adhesion or an internal hernia is the exciting cause or in the "idiopathic" cases, the diagnosis is less apt to be made, especially as the obstructive symptoms are the exception rather than the rule; the cases may remain under observation while the omentum goes on to gangrene, with perhaps an hematogenous infection added to further sap the patient's vitality and so intensify the operative risk.

473 EAST 141ST STREET.

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CONGENITAL ABSENCE OF LEFT OVARY AND FALLOPIAN TUBE, REPORT OF A CASE, WITH A SURVEY OF THE LITERATURE.

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The following inquiry into the literature concerning congenital imperfections of certain portions of the internal generative organs, has as its principal *raison d'être* a recent personal observation in which such an anomaly was unexpectedly disclosed by exploratory celiotomy.

Partial or complete congenital absence of the internal generative organs, with or without accompanying anatomic imperfection or developmental error of the external genitalia, must occur with greater frequency than surgeons and anatomists have appeared to generally believe, as shown by the multiplicity of such examples recorded in ancient and modern literature. Upon the basis of present anatomic and embryologic understanding, it is difficult to appreciate why one portion of the genitalia should develop normally, whereas another may be either congenitally absent or exhibit marked evidence of anatomic imperfection, inasmuch as the entire reproductive system has a common origin, viz., the Wolffian and Müllerian ducts. Strange as the observation may appear, however, a female may possess normal ovaries, and be minus Fallopian tubes, uterus and vagina; on the contrary, she may possess one or all the latter without the former.

The various congenital generative anomalies, in the order of their frequency, may be approximately stated as follows:

(1) VAGINA:

- (a) atresia,
- (b) absentia,
- (c) duplex and septate,
- (d) rudimentary,
- (e) rectal, perineal and abdominal ostia.

(2) UTERUS:

- (a) atresia (cervical),
- (b) absentia,
- (c) duplex and septate,

- (d) rudimentary,
- (e) cervical duplication and bifurcation.
- (3) OVARIES:
 - (a) unilateral or bilateral absentia,
 - (b) unilateral or bilateral displacement,
 - (c) unilateral or bilateral atrophy.
- (4) OVIDUCTS:
 - (a) unilateral or bilateral atresia,
 - (b) unilateral or bilateral distal displacement,
 - (c) unilateral or bilateral ostial duplication.

Since the scope of this dissertation must be limited to congenital tubal and ovarian anomalies, further consideration cannot be accorded other developmental defects, although the general subject of congenital generative imperfections possesses absorbing interest. To ascertain the essential causative factors which may be concerned in the production of congenital errors of development in any anatomical situation would require careful investigation of the more profound physiological problems, even including study of the intricacies of embryogenesis and organogenesis, which cannot be legitimately included herein. However, the brief statement may be permitted that, in so far as congenital anomalies of the genitalia are concerned, the most reasonable explanation for their existence may be found in accidental inclusions and inherent imperfections of the original ducts from which these structures are derived.

Congenital absence of one or both ovaries has been frequently observed. Hunter, Vidal, Chausier and many others record typical instances in which both ovaries were absent, and at one time Thudicum collected twenty-one examples of this nature; observations published by Cripps, Pears, Morgagni, et al., indicate that they have also noted instances of total ovarian absentia. Cripps' patient was a girl of eighteen with infantile uterus and no ovaries; she had neither menstruated nor exhibited signs of puberty. Lauth and Ruband each cite cases in which the ovaries were rudimentary. Congenital absence of both ovaries associated with other anatomic defects have been noted by Ferguson, Spruill, Stewart, Garcia, Todd, Frank, McCann, Ramage, Ladinski, Wright, Withrow, Tuttle, Faidherbe, Dorland, and many other observers.

I wish to express disagreement with those who claim that "when both ovaries are absent there is lack of development of the mammae and other sexual organs"; and also that "when one ovary only is absent the corresponding side of the uterus is poorly developed!" There would appear no ten-

able physiologic reason why absence of one ovary should cause limitation of uterine development, nor is the procreative capacity of the individual thereby impaired. In thousands of instances one ovary and the corresponding tube have been surgically extirpated for relief of unilateral pelvic pathology, without interfering with future child-bearing function; moreover, as in the case to be cited in detail, one ovary and one tube may be congenitally absent without disturbance of anatomic development, menstrual function, or procreative ability. The assumption that abnormality of the external genitalia also implies imperfection of the internal organs, is also not in accord with the facts. Hundreds of instances of absentia or tresia vaginae have been recorded where the uterus, Fallopian tubes and the ovaries were normally developed, and the converse is equally true.

It is the belief of certain observers that absence of the ovary is due to abnormal attachments of adjacent structures in consequence of which development of the ovarian *anlage* is arrested and atrophy follows. Obviously, however, this represents an "explanation which fails to adequately explain," since it contains no suggestion as to why in one instance there should occur abnormal attachments with consequent obliteration of the ovarian *anlage*, whereas in a million others the causative factors which are presumed to produce such phenomena remain inoperative. Furthermore, not infrequently normally situated ovaries are persistently rudimentary, their egg-producing function being imperfectly established, or never assumed. The occasional occurrence of unilateral or even bilateral ovarian duplication is said to originate from constriction or isolation of certain portions of the primary *anlage*, and a strange feature in such instances is that each supernumerary ovary thus produced may possess a normal oviduct and ligamentum proprium!

Although not strictly pertinent to the subject the observation may be interesting that, in those not infrequent instances where menstruation, ovulation and pregnancy occur following the surgical extirpation of both ovaries and both Fallopian tubes, the explanation may invariably be found in the presence of supernumerary ovaries and oviducts. While the possible existence of supernumerary ovaries and tubes was vigorously disputed by certain of the older authors, the painstaking researches of Biegel, Puech, Thudicum, Winckel, Desinety, Paladino and many more recent observers, have incontestably established the fact that such anomalies do occasionally occur. In addition thereto the clinical observations already mentioned—

menstruation, ovulation and pregnancy following bilateral salpingo-oophorectomy, furnishes evidence which no one can reasonably hope to successfully refute. Sippel records an instance of third ovary; Mangiagalli found a supernumerary ovary in the body of a stillborn child, situated to the inner side of the normal organ; Winckel discovered a large supernumerary ovary connected to the uterus by its own ovarian ligament; Klebs found two ovaries on one side, connected by a band three-fifths of an inch long; similar examples are cited by Doran and many others. Incidentally, perplexing medico-legal questions have arisen where women have borne children after the surgeon stated he had totally removed both tubes and ovaries and in consequence that future pregnancy would be impossible; but further consideration of that phase of the subject would be inappropriate herein.

One or both ovaries may be congenitally displaced in such degree that even should ovulation occur, the ova would necessarily fail to reach the tubal ostia; thus the woman would be rendered practically sterile, although potentially fertile. The ovaries may occupy the cul de sac of Douglas, the vaginal wall, the inguinal regions, the labia majora, the rectum, etc. Munde, Barnes, Lentz, Madden, Smith and a host of others describe such instances. Cloquet mentions a case in which the ovary, tube and uterus were found in the inguinal canal; Peuch collected nearly one-hundred instances of inguinal ovarian hernia, and about twenty of the crural type. One example of bilateral crural ovarian hernia is cited by Otte. Tedford refers to a curious instance in which the ovary became separated from its normal attachments; after the patient had suffered for a considerable period from intestinal invagination and inflammation of the ovarian tissue, the ovary was discharged through an opening into the sigmoid and thence expelled from the anus.

Even when apparently normal in development and anatomic situation, the ovaries may later become atrophic and consequently functionless from interference with innervation or obliteration of the blood supply.

According to available literature, congenital anomalies of the ducti Fallopii are of rather infrequent occurrence. As in case of the ovaries, I wish to oppose current opinion with respect to the presumed relationship between tubal absence or imperfection and other congenital generative developmental errors, i. e., that other anomalies should be invariably expected where the oviducts are absent or mal-formed. The statement lacks definite confirmation that grave malformations of other

portions of the generative tract are associated with tubal absentia. As illustrated by the example to be reported herein, there may be congenital absence of one tube and ovary without other generative imperfection; and normal oviducts may likewise exist where the ovaries, uteri and vaginæ are defective.

As a result of local arrest in tubal development there may occur atresia or stenosis in any portion of the tubal lumen; sometimes the caliber is markedly increased; one tube may be longer than the other; there may be several fimbriated abdominal ostia. Ferraresi, for instance, observed in one tube six openings surrounded by distinct fimbriæ. Supernumerary tubes with and without corresponding ovaries have been observed; these may originate in cystic diverticula, or in the mesosalpinx as independent tubes with normal fimbriæ.

One or both Fallopian tubes may be partially or completely absent without other genital malformation. Blasius reports an instance of deficient oviducts; Blot cites a case where one ovary was atrophic or rudimentary, with absence of the corresponding tube. Doran speaks of multiple Fallopian tubes, and several varieties were noted by Richard; such tubes are sometimes fused or adherent to the uterus or ovary. Fabricius describes a case in which one tube opened into the rectum. Lejars mentions an instance of congenital atresia of the left tube, and one of bilateral tubal atresia is recorded by Doleris.

Purcell performed necropsy upon a woman who died in the ninth month of pregnancy, finding on one side a uterus of ordinary size and shape for that period of gestation and containing a fully developed fetus, with one ovary and a single Fallopian tube. Upon the other side there was a second uterus, unimpregnated and of normal size, to which another tube and ovary were attached. These uteri were distinct and almost entirely separate.

Goldspohn operated by celiotomy upon a married woman with large pendulous abdomen, who had suffered for a considerable period with abdominal pain and other symptoms presumably due to salpingitis or appendicitis. A diseased appendix was found, but there were no internal generative organs. There were the rectum and bladder as in the male, but nothing beyond that. Her external feminine characteristics appeared normal.

Barrett refers to a female of eighteen who had never menstruated; she had been married two weeks, but sexual intercourse was found impossible on account of there being no vagina. Examination also revealed absence of the internal generative

organs. Another young woman (Byford) had normal external but no internal generative organs; she had perfect mammae, good form, enjoyed normal health, and later married.

Todd cites the case of a female of twenty-four, a perfect specimen of physician womanhood from external appearances, who had never menstruated. Examination revealed no hymen, and the ostium vaginae appeared less elastic than normal; the supposed vagina was two and a half inches deep and terminated abruptly. Further investigation disclosed absence of the uterus, tubes and ovaries.

Garcin saw a married woman of twenty, nullipara, who had never menstruated, nor had there been any vicarious hemorrhage. Vagina, uterus and ovaries absent. The undilated urethra would admit the thumb and index finger, and it was through this coitus had been practiced.

Sloan performed necropsy upon a woman of twenty-four. Externally the body presented nothing worthy of note, excepting immaturely developed mammae with absence of nipples, although the areolae were well-marked; mons veneris totally devoid of hair. Uterus, tubes and ovaries absent; ostium vaginae normal, the internal extremity terminating in posterior cul de sac of Douglas. The cavities which the uterus, tubes and ovaries should have occupied were occluded.

James reports congenital absence of the uterus, ovaries and clitoris in a well-developed mulattress of twenty. The external genitals appeared normal; mammae well-developed. Examination under anesthesia disclosed neither uterus nor ovaries; vagina represented by shallow pocket with meatus urinarius near center; the lesser labia appeared normal; clitoris absent.

Stewart (*Medical Sentinel*) mentions a married woman of twenty-eight with masculine mammae and hips; vulva and clitoris normal, hymen absent; fourchette well-developed; a cul de sac 2, 8 c. m. deep "apparently formed by continued assaults of the male organ" in location of vaginal os. Absence of uterus, tubes and ovaries demonstrated by examination under anesthesia. A nodule about 2 c. m. in diameter between rectum and bladder represented termination of genital cord.

Spruill refers to a robust German woman of twenty-two, large and well formed, who had never menstruated. Appearance of external genitals normal; vagina represented by cul de sac one inch deep. Examination revealed absence of uterus and ovaries.

The following personally observed case differs in several essential respects from many of those recorded in the literature:

An exploratory celiotomy was recently performed upon a woman of twenty-four who presented decided indications of right tubal disease, or possibly a chronic appendicitis. Abdominal incision disclosed evidence of existing chronic appendicitis, and also a cystic right ovary. After examining the right ovary and deciding that it should be extirpated—as it is my custom to always examine both tubes and ovaries before removing either—I proceeded to investigate the left side, and to my astonishment the left ovary could not be found. After carefully exposing the left side, a stump of the tube about an inch and a half in length was found, the remainder evidently being congenitally absent. There simply remained this tubal stump with no vestige of the ovary.

The outer extremity of the tubal stump was completely closed in an oblique manner. The corresponding uterine cornu was normal, as was also the remains of the tube which had the usual attachment to the broad ligament. The round ligament was normal and could be traced the customary distance across the pelvis.

The patient was the mother of one child, and had menstruated normally since she was fourteen. She had not previously been subjected to any surgical operation.

A conservative operation was performed upon the right ovary, which was enlarged to three times its normal size, about two-thirds of it being extirpated. I did not feel justified in removing the entire right ovary, as the left was absent. The appendix was also removed.

The patient made an uneventful recovery, and has remained perfectly well.

The anomaly encountered in this case was a great surprise to me, and had it not been feasible to positively demonstrate the condition, possibly I might have overlooked the fact that the left ovary was absent.

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A GLIMPSE INTO PRESENT-DAY MILITARY SURGERY.

A Letter from the Late ERNEST P. MAGRUDER, M.D., F.A.C.S., of WASHINGTON, D. C.

[Dr. Ernest P. Magruder, a talented surgeon of Washington, D. C., Professor of Clinical Surgery, Georgetown University School of Medicine, was one of the many American surgeons who volunteered for Red Cross service in Europe last fall, and one of the all-too-many American physicians whose lives have been sacrificed by the scourge of Serbia typhus fever. He died in Belgrade in April.

The following letter, furnished to the *JOURNAL* by his brother, was written by Dr. Magruder in Gevgelija, Ser-

bia, the "pest-hole of Europe," three days before he acquired his fatal infection. We believe that the posthumous publication of this epistle will interest our readers no less by its informative qualities than by its sentimental association, for it is a vivid pen-picture—sharply drawn in vigorous English phrases—of the horrors and sufferings of war, of the prodigious efforts and self-denying sacrifices of those who seek only to alleviate these sufferings!—Ed.]

Geggelija, Serbia.

Dear ————:

March 23, 1915.

I have wished to write to you ever since we got started here, but the work has been so heavy altogether—converting buildings into hospitals, organization of the whole plant, sanitation, care of the wounded and sick (we began with thirteen hundred patients, mostly surgical)—that when night came one could only topple into bed and hope that the work of the morrow would be less exhausting.

Until lately, when the medical cases exceed the surgical, we had, among other things, an endless variety of compound fractures, gun-shot wounds of the skull, chest, abdomen, arms and forearms, thighs, legs and feet; amputations, single and double; aneurisms, of the common carotid, subclavian, axillary, brachial and femoral arteries; fecal fistulae; the extraction of the greatest variety of shot and shell, huge bullets, shrapnel, grenade and dum-dum; and one hernia of the brain of great interest to me. On the whole, the work has been wonderfully interesting.

This great war is quite educational in its influence upon medical science, because of the new and special nature of its aspects, especially with reference to shell fire. Formerly the surgeon had to treat wounds caused for the most part by rifle bullets. Today his special attention is called to the frightful casualties of grenade and shrapnel. The dynamite grenade was first used at the siege of Mafeking. In the Russo-Japanese War, the Japs used this modern high explosive very effectively. It is cylindrical in form, filled with shimose powder and fitted with a time fuse and percussion cap. It bursts into many fragments and emits a gas which is very painful to the eyes and air passages.

The shrapnel is a projectile fired from a gun and carrying a large number of bullets. At the point of bursting the bullets are charged with an added energy over a wide area. It is the main reliance in the present war's field artillery. It is most effective against large bodies of troops in masses, in mountain and siege artillery, as well as in repelling attacks against sea coast fortifications. Its casing is a steel tube with a solid base. The 3-inch field gun shrapnel weighs 15 pounds, its length is 10 inches and its muzzle velocity 1700 foot seconds. It contains 252 round bullets made of hardened lead. It is referred to as a man killer at 6500 yards. But it has even then on bursting a remaining velocity to the bullets of 865 foot seconds. The fuse is gauged to make the projectile explode at the fractional part of a second in its flight. The preponderance, therefore, of artillery in the present war is a new order of things from the viewpoint of the modern surgeon.

Additional interest centers in the complications of those exposed to the terrifying effects of the

high bursting charge of shrapnel, to aerial arrows and to the various types of flying machines. The new genius of man at war has been challenged by the old maxim, "familiarity breeds contempt," and he has accepted the challenge, knowing full well that man's nervous system is found at last not made of adamant, that there is an end to nerve power, nerve endurance. Truly, nerve-racking as well as death-dealing mechanisms have been the greatest study of the day. Nerve tension, from waiting for and dreading an attack, extreme excitement and mental confusion, aggravated by fatigue of mind and body and the ever-present menace of exhaustion—these have been calculated by man with mathematical precision and embodied in machines of death turned loose from hell to execute his purposes. Hence the moral and mental nervous wrecks we meet and those suffering functional effects from the near-by explosion of a large shell, as seen in the temporary loss of speech and hearing. Added to these are the terribly mutilating wounds of flesh and bone further complicated by infection.

These shrapnel wounds also give rise to the most virulent forms of sepsis. The present day rifle bullet travels so fast that it is often sterilized by the heat generated by the friction caused by the velocity of its flight. A wound by such a bullet, if it carry in no clothing or other septic matter, may heal promptly; whereas, the bullets carried within the shell of shrapnel frequently give rise to a most virulent form of infection, known as "spreading gangrene." This requires quick amputation of the member, and isolation to prevent its spread to other wounded soldiers in the ward. Modern treatment is powerless to control this form of blood poisoning in a badly infected case and I am now testing some of the latest discoveries in antiseptics in the hope of finding an effective remedy against this old scourge of war which the immortal Lister buried and which the modern shrapnel, curiously enough, has brought back to life.

I have only time to mention a number of cases of frostbite requiring amputation of one or both feet, sometimes of one or of both legs; several cases of lock-jaw; and a large hernia of the brain, following a compound shrapnel wound of the skull. The recovery of this patient, following operation, has been to me perhaps the most interesting and gratifying of all my cases.

There are many things of which I should like to write, but the censorship here in the war zone, of course, prevents.

Normally the town has about 7,000 inhabitants. It is a part of old Macedonia, held by the Turks for 500 years, and won by Serbia in the late Balkan War. The surroundings are beautiful, especially as one views the rising sun reflected from the snow-capped mountain tops. Saloniki (old Thessalonica, Greece, upon the Aegean Sea) is only four hours' run by train. So that we do not feel cut off entirely from the outside world.

On the whole, the work of the mission has been very hard, but the consciousness of the relief it has given to awful suffering in its manifold manifestations, has greatly lightened our labors. * * *

Faithfully yours, ERNEST P. MAGRUDER.

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WALTER M. BRICKNER, M.D., Editor

NEW YORK, AUGUST, 1915.

PYELOGRAPHY.

To cystoscopy and to radiography more than to any other recent invention or discovery we owe the development of urologic diagnostics and the establishment of modern urology. The inevitable combination of these two procedures in pyelography represents a unique and interesting phase in that development and adds another to the many valuable resources with which the urologist's diagnostic equipment has been steadily expanding.

Introduced by Voelcker and von Lichtenberg in 1906, pyelography attracted but little attention for some time and it is only in the last five years that it has been seriously and generally studied. To Braasch, of the Mayo Clinic, a pioneer in this field, belongs the credit for the most extensive and consistent of these studies. His recently published monograph,* based upon several thousand pyelograms, is therefore interesting as an authoritative exposition of the possibilities and the present limitations of this diagnostic aid, the value of which in various conditions he had insisted upon in earlier writings.

Like many other diagnostic and therapeutic procedures pyelography was soon found to possess possibilities for mischief. In several cases the kidney was found infarcted or infiltrated by the colloidal silver (collargol). Less dangerous substitutes then were tried—argyrol 40%, suggested

by Keyes, silver oxid and silver iodid, as suggested by Uhle and Pfahler, nargol, xeroform and, most recently, thorium nitrate and sodium citrate in neutral solution, recommended by J. E. Burns in the *J. A. M. A.*, June 26, 1915. While argyrol and other substitutes for collargol are less injurious to the kidney substance, Braasch and others believe that damage to the kidney will not occur if undue pressure is avoided. He therefore employs the gravity method of introduction instead of the hand syringe, and avoids the production of pain, which by many is sought as an indication that the kidney pelvis is suitably filled.

Obviously, there are certain conditions which a pyelogram or, more properly, pyelo-ureterogram, can at once clearly demonstrate or exclude, e. g., a stricture kink or dilatation of the ureter, a marked hydronephrosis, a gross deformity in the outline or position of ureter or pelvis, the evident location of a supposed stone outside of the urinary tract or its probable location in the ureter or pelvis, etc. Beyond these gross evidences, which anyone at all familiar with roentgenograms would recognize, the inexpert must proceed with caution. It is interesting to observe in Braasch's pictures the many varieties in which the shadows of normal kidney pelvis may appear and the apparent similarity that some of these bear to the shadows of slight or moderate hydronephrosis. As with other roentgenographic interpretations, the finer diagnostic readings can come only from those of much experience, but this experience it is worth the urologist's time to acquire. By it Braasch has learned to distinguish inflammatory from mechanical dilatation of the pelvis, to recognize, in many cases, the presence of tuberculosis of the kidney, renal tumor, etc.

As with interpretations of roentgenograms of the alimentary tract, so with pyelograms, even the experienced eye may sometimes be deceived and one must not be too insistent on the significance of minor variations in outline. To take a gross finding as example, the apparent disappearance of a supposed stone shadow within the shadow of the subsequently injected kidney pelvis is only presumptive that the lesion is a stone. It is not by any means proof beyond a reasonable doubt. The apparent position of a shadow-forming substance within the substance of the kidney, as seen stereoradiographically, seems fairly convincing ocular proof of a renal stone; yet even here, occasionally, the kidney may be found quite normal. To cite a unique instance as evidence that all the diagnostic aids may some times fail where they seem most certain: Seelig recorded (*Ann. of Surgery*, Vol.

*Pyelography (pyelo-ureterography). By Wm. F. Braasch, M.D. W. B. Saunders Co., 1915.

48, p. 388) the case of a woman who had repeated attacks of severe pain radiating from the right loin towards the bladder, with marked hematuria. No tubercle bacilli. Five roentgenograms showed a clear-cut shadow in the path of the intrapelvic portion of the right ureter. A ureter catheter was blocked on the right side about two inches above the bladder; "even a stylet-armed catheter could not be forced by the obstruction," and the attempt was followed by severe pain. At operation the right ureter was exposed extraperitoneally throughout its entire length, but no stone was found in it. At the site where the stone was expected the "ureter was kinked as if pulled upward and inward" and a hard nodule was felt resting upon it. The peritoneum was there opened, and the appendix, containing a few drops of pus and a stony-hard concretion formed about a small seed, was found adherent to the ureter! Surely in that case every clinical symptom and physical finding pointed definitely to a ureteral calculus, and there is little doubt that a ureterogram, too, would have shown the shadow of the stone in the line of the shadow of the ureter.

We mention these possibilities of error not to discourage enthusiasm in pyelography but, quite the contrary, to urge its frequent employment, for only thus can the surgeon learn to recognize peculiarities in the shadows and to interpret them. In many cases pyelography is of very great assistance to accurate diagnosis, in some cases it is quite indispensable.—W. M. B.

BOILING WATER INJECTIONS IN THE TREATMENT OF CAVERNOUS ANGIOMATA.

The management of large cavernous angiomas has always been a serious and often a quite baffling surgical problem. Ligation, even piecemeal, is not applicable, as in smaller vascular tumors; the attempt at destruction by electricity is a tedious and painful course, often vastly disappointing; ignipuncture, likewise tedious and productive of sloughing, is unacceptable if the neoplasm is extensive in depth or surface; chemical injections cause sloughing, often infection and, if safe, affect too limited areas, while extirpation with the knife is quite forbidden, not only by the great technical difficulties inherent, but also because it would involve the too extensive removal of irreplaceable tissue. This is especially true of the cavernous angiomas found on the face and neck of the new-born. These often involve the entire thickness of the cheek, and sometimes the tongue. In bad cases they may extend

from the lip or eyelid to the ear, from the scalp to the clavicle. They have, too, a tendency to grow steadily in size.

Formidable as is the problem presented by such congenital vascular growths, they cry out loudly for treatment. By their very ugliness they interfere with the enjoyment of life, the continuance of which they threaten by the always imminent danger of sloughing and infection and, especially, of violent hemorrhage.

Since the ordinary methods of treatment applicable to capillary and to small cavernous angiomas are insufficient or dangerous when applied to large growths under consideration, it is gratifying to note in current literature that very satisfactory results have been achieved by the simple method introduced by John Wyeth of New York, viz., the injection of boiling water. Thus, J. Shelton Horsley in his interesting manual on *Surgery of the Bloodvessels*, just published,* records that he "has used this method successfully in several angiomas of the face and in a large angioma of the umbilical region," and Francis Reder of St. Louis reports in *Surgery, Gynecology and Obstetrics*, July, 1915, its employment in 26 cases with very gratifying results in all.

With reasonable precautions, easy of application, the method seems to be entirely safe, even when large amounts of the boiling water are injected. Reder records the injection, in one case, of six ounces at a single sitting. As much as three or four ounces, he says, may be injected at a sitting in a tumor the size of a hen's egg, about ten minutes being consumed in making the injection. The heat of the fluid and of the needle makes the introduction of infection very unlikely, even if the skin is not disinfected which, however, it should be. The boiling water causes an immediate coagulation of the blood and of the albuminoids of the connective tissue and blood vessels, and destroys the endothelium of the blood spaces. It may, with apparent safety, be injected in the course of an artery feeding the growth. The danger of embolism does not appear to be great, but the precaution is advised of manual compression about the growth. Accidental scalding of the skin is avoided by anointing it with vaseline and covering the areas in the neighborhood of the injection with wet compresses. Care should be taken that the injection is not sufficiently superficial to cause sloughing, and that the needle is not thrust in so far that the hot water is thrown into the sound tissue at the opposite margin of the angioma. General narcosis is usually, not always,

*C. V. Mosby Co., St. Louis.

required; but the after-pain is fleeting. To minimize the edema produced, ice or cold compresses may be applied for a few hours.

It is important that the water should be injected at or near the boiling point. A needle of generous caliber is therefore essential. Reder likes best a glass syringe with an asbestos wound plunger, a shoulder on the barrel and a good-sized ring on the piston, with a slip joint for the needle. Horsley adheres to the all-metal syringe, which has the advantage that the water within it can be re-heated over a flame. Whichever is employed the fluid must be conveyed expeditiously from the vessel in which it is boiled to the tissues. Cotton or thick rubber gloves or gauze compresses are used to handle the uncomfortably hot instrument. The water is injected until the surrounding tissues become gray and tense, but not overdilated. Horsley plunges the needle into the most prominent part of the tumor. To avoid sloughing Reder, on the contrary, makes his first injections well beneath the neoplasm, entering the needle through sound skin at the margin of the growth, this procedure being to assure coagulation of the entering vessels. Area after area may be treated at a single sitting, but if the growth be quite large its complete destruction had best not be attempted at once. It is interesting to note that the normal tissue surrounding an angioma is not affected by boiling water injected into it, the blood vessels of the one not being continuous with the blood spaces of the other. The softening of the coagulated area is gradual and a few weeks should be allowed to elapse before re-injecting in the same neighborhood. In large growths the cure may thus take several months. It should be effected without surface scarring, which results, of course, if sloughing follows injudicious injections.—W. M. B.

Surgical Suggestions

Don't treat a sciatica without a *thorough* physical examination. It is sometimes due to a carcinoma in the spine metastatic from an overlooked tumor of the breast.

Don't operate upon a case of cancer before excluding, as far as possible, the existence of a metastasis. It would be distressing and embarrassing to learn soon after submitting a patient to radical breast amputation that the pains she had complained of in the extremities came from a metastasis in the vertebrae.

Surgical Sociology

Ira S. Wile, M. D., Department Editor.

SOME STATISTICAL PROBLEMS OF CANCER.

Among the numerous diseases still baffling medical science none presents more interesting problems than the almost ubiquitous cancer. It is a disease veiled in doubt and shrouded in mystery. Its etiology is unknown. Its medical treatment is apparently negligible. Its relation to industrial life is constantly a source of discussion. Research laboratories have been founded to pry into its secrets. Institutions have been provided for the maintenance and care of those willing to go thither to die. It attacks childhood and middle life but fortunately its direct results are in the late years of life.

There is much food for thought in noting that while the death rate per hundred thousand population for typhoid fever has decreased from 35.9 in 1900 to 17.9 in 1913, and tuberculosis has declined from 201.9 in 1900 to 147.6 in 1913, and diphtheria has dropped from 43.3 in 1900 to 8.8 in 1913, and dread pneumonia has fallen from 185.5 in 1900 to 132.4 in 1913, cancer has slowly risen from 63.0 in 1900 to 78.9 in 1913, along with organic heart disease which has risen from 123.1 in 1900 to 147.1 in 1913 and nephritis which has mounted from 89.0 in 1900 to 102.9 in 1913.

In the registration area during 1913 approximately fifty thousand persons died from carcinoma, with a death rate of 78.9 per hundred thousand population, comprising 5.6 per cent. of all the deaths in the registration area. The only diseases which carry off a larger proportion of the population are tuberculosis of the lungs, organic heart diseases, pneumonia, nephritis, congenital debility and violent deaths.

The median age at death was 60.4 in 1913. From the point of view of age, cancer is a less serious drawback to the development of society than is, for example, tuberculosis, with a median age at death of 32.2 or typhoid fever with a median age of 25.3. This fact is accentuated in the light of the median age at death from all causes for 1913 which was 42.2.

On the other hand, the increase in the occurrence of cancer apparently is manifest during all decades. During the 27 years from 1880 to 1907 there was a 90 per cent. increase in the death rate from cancer in persons over 60 years of age, but there was also a 46 per cent. increase from the death rate of cancer among persons between the ages of 20 and 30 years, and 10 per cent. increase for those below the age of 20 years. This illustrates, in a way, that there has been a general advance in the cancer death rate at each age period.

Among the various theories of cancer, there is still much discussion as to whether the disease is due to a microorganism, an embryonal inclusion, dietetic disabilities, either general or specific, or

hereditary influences. It is quite possible that in the groping after the truth there has been misinterpretation, owing to an attempt to account for the etiology on some particular theory forming part of the preconceived notion of the investigator.

It is socially of immense importance to discover whether cancer is dependent upon the ingestion of tea, coffee or alcohol or whether the figures relating to these are merely accidental in their association. It has long been felt that cancer was markedly influenced by occupation. The scrotal cancer of the chimney sweep has long been adduced as an indication of the production of cancer through sooty irritations. Workers in tar, pitch, paraffin and anilin apparently are more susceptible to epitheliomata than are other industrial workers.

How far traumatism constitutes a factor is still doubtful. In considering, for example, the percentage of death from cancer between the age of 55 and 64 years, the mortality of tailors from cancer is almost double the rate of death from tuberculosis, despite the sedentary and indoor occupation of tailors. Draymen, hackmen, teamsters, and iron and steel workers, during the same decade do not show any such high mortality rate from cancer as would be expected if trauma were a marked factor in the causation.

There appears to be no apparent causal relation between cancer life in cities or rural district, nor is there any special effect of varying climatic conditions within the country. A great problem is involved in the fact that negroes are less prone to suffer from cancer than whites. Herein is an opportunity for more careful, scientific research.

The general impression that cancer is increasing at all ages appears to be sustained by statistical studies. It is not merely a question of more accurate diagnosis and more careful registration, admitting, of course, that both of these have improved and have altered the character of statistical figures. The decrease in the number of deaths from tuberculosis has permitted more people to live to advanced age, but this does not account for the increased cancer mortality below the age of 30 years. Incidentally, early diagnosis would lead to more prompt surgical intervention. Despite this, the mortality of skin cancer has increased tremendously in the face of the ease in diagnosis of the lesions and the promptness with which surgical intervention may be secured. The mere prolongation of human life to the later decades does not account for the increase of the mortality of cancer in proportion to each 100,000 of the population. In other words, the absolute increase of mortality might be accounted for, but the actual ratio of increase per hundred thousand would still require explanation.

In the light of the widespread interest in cancer and the precancerous stage, with the campaigns of education that are being instituted for the purpose of making men and women realize the seriousness of cancer as a disease and the importance of early diagnosis and surgical treatment, one hesitates to see physicians lending themselves to statements tending to create false, misleading, or groundless

hopes in the hearts of cancer sufferers or their families. There is an unusual responsibility upon the medical profession to give the medical truth to the public, but this truth must be the whole truth and not a half truth. There should not be paraded half-baked methods of treatment which up to the time of report have presented no satisfactory evidence of advance over caustic pastes, necrotising injections, or the results achieved by radium, the x-rays, methylene blue internally, or other therapeutic agents.

The treatment of inoperable cancer is still hidden by darkness while probably 80 per cent. of carcinomata reached the inoperable state, and it is therefore of the utmost importance to establish some mode of attacking the disease during this period. The greatest efforts must be spent in educating the public to giving prompt attention to their ailments during the curable stage. Surgery at the present may not deal in an etiologically sane manner with the problems of cancer, but it cannot be gainsaid that surgery, early and immediate, is at present the only practical solution of the cancer problem. Until the etiology of cancer is determined,—and only in this light may rational therapeutic measures be devised,—the stress of surgical opinion should be placed upon early diagnosis and early operation.

The victims of society suffering with cancer are not interested in Cohnheim's theory, after the disease is developed, nor does the ingestion of higher proteins appeal to them very strongly when there is the unhappy regurgitation from a gastric carcinoma. Society demands relief, cure when possible, and palliation as a last resort. The surgery of to-day is the social solution of the cancer problem. In its connotation, this means popular education, early diagnosis, adequate hospital facilities, prompt operation.

FOOD AND GASTRIC ULCER.

The observation of relief of gastric distress by food ingestion is of prime importance in diagnosis of uncomplicated peptic ulcer. If its history is constantly obtained, it is practically pathognomonic in three out of five cases. While patients, on casual questioning, frequently state that food distresses them, yet careful inquiry will elicit the fact that food does not at once cause discomfort, but that such comes on from one to four hours following ingestion. If the gastric lumen is not obstructed (hour-glass contraction) or if the pyloric channel remains patent, our observation is that the duration of food relief of pain bears direct proportion to the size and character of the meal taken. Small amounts of food give relief for a shorter period than do large, and liquid food relief is not infrequently more prompt than that obtained by solids. The dread of pain following food intake often leads to an anticipatory attitude on the part of the patient. —FRANK SMITHIES, in *Interstate Medical Journal*.

Book Reviews

John Shaw Billings. A Memoir. By FIELDING H. GARRISON, M.D. Octavo; 432 pages; illustrated. New York and London: G. P. PUTNAM'S SONS. The Knickerbocker Press, 1915.

The reading of this biography has afforded two dominant impressions. First, that John Shaw Billings was a greater man than we had known; and second, that he lived a fuller and more varied life than any other member of our profession that we recall. Few physicians, we venture to say, would associate Billings with anything more than the founding of the Catalogue of the Surgeon General's Public Library and the organization of the New York Public Library. These activities, however, are only a small part of Billings' achievements. He began his medical career as a demonstrator of anatomy. He then became an army surgeon and not only had much active surgical experience, but did much work in planning and organizing hospitals during the Civil War. He expanded the insignificant Surgeon General's Library into the greatest, if not the largest, medical library in the world. Moreover, he made the immense medical literature of the world once and for all available by planning the famous Catalogue—a unique and tremendously important achievement. Indeed, much of the early indexing he did himself with Dr. Fletcher. He conceived and started the monthly *Index Medicus*. These labors make him, in Dr. Garrison's words, probably the foremost medical bibliographer in the entire history of medicine. He was one of the pioneers in hygiene and sanitation, and throughout his life was one of the recognized authorities upon these subjects. He held, for a time, the chair of Hygiene in the University of Pennsylvania. He was unquestionably the foremost planner and organizer of hospitals in this country, and his work in connection with the foundation of the Johns Hopkins Hospital is one of his greatest achievements. He not only planned the building, but also conceived the splendid working scheme of this institution—a scheme that has profoundly influenced medical teaching in this country. Moreover, he selected many of the staff, to whom much of the success of this institution is due, showing that among other attributes, he was a keen judge of ability. He was one of the planners of the great Peter Bent Brigham Hospital, recently built in Boston. He was the first American physician invited to address the International Medical Congress. The last large work of Dr. Billings' career took him out of his chosen profession—the organization and direction of the New York Public Library, a man's job in itself.

These are only the more important of his labors. Throughout his life, like John Hunter, he was avid for medical study. He did much and important work upon the pathogenic parasites and bacteria. In his spare moments he dissected and studied botany. He was continually writing and making addresses upon the more diverse subjects—hygiene and sanitation, medical education, medical libraries and bibliography, vital statistics, craniology, biography and history, and public questions. The tabulation compiled by Dr. Garrison of 171 papers and books, indicates Billings' immense literary activity. His personality, sketched by the author in a separate chapter, is in accord with the bigness of his work.

Two attributes, especially, of this truly great American physician, impress the reader of this interesting biography. They are the fortitude and inconsideration of self with which he continued to plan and to execute even while suffering greatly from a painful malady for which he submitted to operations; and the prodigious energy he expended in conducting the laborious and painstaking tasks he assigned to himself. He not merely planned and directed, he himself labored vastly. When Congress, upon the urging of Jacobi and others, appropriated the money to supply the Surgeon General's Library with the back files of all the important foreign medical journals, Billings, the librarian, lacking much assistance, himself

night after night, indexed and cross-indexed all the articles in these journals, *vanload after vanload!* Surely, a task that would have staggered all but such an exceptional giant of persistence and industry!

Dr. Fielding H. Garrison, the present editor of the *Index Medicus* and principal assistant librarian in the Surgeon General's Library, is, we think, Billings' successor as the leading American exponent of medical bibliography and history. His Introduction to the History of Medicine, as well as his bibliographic accomplishments, establishes him in this position. For this reason, and because of his familiarity with the subject, Garrison was peculiarly fitted to write this fascinating and affectionate tribute to his former chief. And yet he does not indulge in laudation. He sets forth, in his usual pleasing style, the story of Billings' life and accomplishments merely as a biographer; no praise was needed.

The reading of this book is a joy from cover to cover.

The Treatment of Fractures, With Notes upon a few Common Dislocations. By CHARLES LOCKE SCUDDER, M.D., Surgeon to the Massachusetts Hospital; Assistant in Surgery, Harvard Medical School, Boston. *Eighth Edition.* Octavo; 734 pages; 1,057 illustrations. Philadelphia and London: W. B. SAUNDERS Co., 1915. \$6.00, net.

The new edition of this very practical and deservedly popular work shows but few minor changes as compared with the seventh edition, published in 1911. So solidly is the book based on rational therapeutics and competent observation that few changes might, indeed, be looked for in the descriptions of fractures and their non-operative management. New material has been added to the consideration of fracture of the jaw and the acetabulum. A paragraph is now devoted to fracture of the greater tuberosity of the humerus—a frequent, often overlooked cause of shoulder disability that therefore deserves longer consideration. Several new illustrations have been added to the many admirable ones that have constituted so valuable a feature of this work.

In his preface Scudder says, "It appears to me that the greatest recent advance in the treatment of fractures of bone is the application of the principle of the autogenous bone-graft in cases of delayed union and non-union." We quite agree with him, and we were disappointed and surprised to find that the subject is not alluded to again in the text itself, "an autogenous bone graft" is added to the list of fixation agencies in the 9-page chapter on *operative treatment*. Otherwise this scant and unsatisfactory chapter is repeated as it appeared in the seventh edition. To be sure, the chapter is introduced chiefly as a plea for conservatism, but it is illustrated by pictures of bone plates, clamps and drills and it does give a list of fractures that most frequently offer rational indications for open treatment. Admitting that operative management has a definite and important place in the therapy of fractures, and recognizing the dignity of, and the wide interest in that phase of the subject this chapter should, we think, have been expanded into an adequate exposition of the various operative procedures, their techniques, indications and contraindications. It would have been better, otherwise, to omit this chapter altogether which, by its brevity, serves only the purpose to emphasize the author's very proper attitude that most fractures may be well treated without the knife.

Operative Gynecology. By HARRY STURGEON CROSSEN, M.D., F.A.C.S., Associate in Gynecology, Washington University Medical School and Associate Gynecologist, Barnes Hospital; Gynecologist, St. Luke's Hospital, St. Louis. Large octavo; 670 pages; 772 illustrations. St. Louis: C. V. Mosby Co., 1915. \$7.50.

In this handsome volume Crossen has made a welcome contribution to the various manuals and treatises on operative gynecology. It is an altogether excellent exposition of, and disquisition upon, gynecologic techniques. All the useful and accepted operations are described in admirable detail, and each step is beautifully illustrated with original drawings by Ivan F. Summers. Of these illustrations of technique there are about 750, most of them half-tones, and all of them of the highest order of excellence.

At first blush the critical might be inclined to complain that Crossen has described too many operations. A careful reading of his interesting text disposes of this criticism, for he takes pains to describe the character of each case that is best suited for one or another type of operation. Indeed, he takes the very proper stand that the time has passed for the attempt to develop "the best operation" for uterine prolapse, for retroposition, for relaxation of the vaginal walls. That such attempts have been and still are being made is well known. No one of the many excellent procedures devised is best for all cases, and it is one of the attractive features of Crossen's work that it teaches—as much as this can be taught didactically—the wise selection of operation for the lesion in hand.

We take pleasure in warmly recommending this attractive and useful book.

Text-Book of Surgical Operations. Illustrated by Clinical Observations, for Physicians and Students. By PROF. FEDOR KRAUSE, Directing Physician, Augusta Hospital, Berlin, in association with EMIL HEYMANN, M.D., Chief Physician, Augusta Hospital. Translated and edited by ALBERT EHRENFRIED, A. B., M.D., F.A.C.S., Assistant Visiting Surgeon, Boston City Hospital, etc. In six volumes. *Volume I*. Large octavo; 267 pages; 55 colored plates bearing 233 illustrations and 61 text figures. New York: REBMAN Co., 1915. \$6.00.

Ehrenfried is doing a useful service in preparing an American edition of the distinctive Krause-Heymann system of operative surgery, expressive as it is of the clinical experience and surgical genius of Fedor Krause, and differing, as it does, from other works on operative surgery in that each procedure is illustrated by an individual case in the clinic, the description of which is followed to the end-result.

Without sacrificing anything of importance in the translation Ehrenfried has edited the work freely, adapting it, where necessary, to American practice, interpolating new case descriptions and other matter. He has maintained, however, the plan and spirit of the work—clinical demonstrations and discussions of operative surgery.

This, the first volume deals with general surgical technique (preparation, anesthesia, asepsis, after-treatment), and operations on the face, the orbit, the nose and accessory sinuses, the ear and mastoid, and the cranial nerves. The many and excellent original illustrations were drawn during the operations, in Krause's clinic, by Max Landsberg.

The Origin and Nature of the Emotions. Miscellaneous Papers. By GEORGE W. CRILE, Professor of Surgery, School of Medicine, Western Reserve University; Visiting Surgeon to the Lakeside Hospital, Cleveland. Edited by AMY F. ROWLAND, B.S. Octavo; 240 pages; illustrated. Philadelphia and London: W. B. SAUNDERS COMPANY, 1915.

This volume consists of eight addresses, all, with the exception of the last, having a common theme. These addresses are the following: Phylogenetic Association in Relation to Certain Medical Problems; Phylogenetic Association in Relation to the Emotions; Pain, Laughter and Crying; The Relation Between the Physical State of the Brain Cells and Brain Functions—Experimental and Clinical; A Mechanistic View of Psychology; A Mechanistic Theory of Disease; The Kinetic System; Alkaescence, Acidity, Anesthesia—A Theory of Anesthesia.

It is impossible within a short review to summarize the many and ingenious hypothesis that Crile proposes. His main theme, briefly is this: "Injuries awaken those reflex actions which by natural selection have been developed for the purpose of self protection." This phylogenetic association expressed by fear is responsible for many diseased states, the most important of which are shock and exophthalmic goiter. Upon this principle of eliminating fear as far as possible, and the effect of fear upon brain cells, is based Crile's familiar hypothesis of anoci association. As some of the titles indicate, Crile is a strong mechanist.

Crile shows much ingenuity in the elaboration of his

theses. In many instances his arguments are convincing, and in all, highly suggestive. While it is our impression that he often is carried away by the pressure of his ideas, we forgive him nevertheless, because he thinks we have at present too many observers and deductors in our profession. What we need are inductors of the kind that Crile so well exemplifies.

Fewer and Better Babies or The Limitation of Offspring, by the Prevention of Conception. By WILLIAM J. ROBINSON, M.D., Editor of *The Critic and Guide*, and of *The American Journal of Urology*; Author of "Never-Told Tales," "Practical Engenies," etc. With an Introduction by A. JACOBI, M.D., LL.D. Duodecimo; 245 pages. New York: THE CRITIC AND GUIDE Co., 1915. \$1.00.

For the rational limitation of offspring, for the abrogation of laws that discourage the prevention of conception, Robinson has long and earnestly contended in his journal, *The Critic and Guide*, and in many other writings. In this interesting little book his arguments are set forth fearlessly and in his characteristically vigorous style. They are supported in an introduction by Jacobi. Two chapter headings and the safe and the unsafe means, respectively, of preventing conception are followed by blank pages—in unwilling obedience to, and as a protest against the censorship that would forbid the circulation of the book were these chapters included!

Collected Papers of the Mayo Clinic, Rochester, Minn. Edited by MRS. M. H. MELLISH. *Volume II*, 1914. Octavo; 814 pages; 349 illustrations. Philadelphia and London: W. B. SAUNDERS Co., 1915. \$7.00.

This is the eighth volume of the collected publications of the Mayo clinic, the sixth in annual sequence. It is arranged much as the preceding volumes, is as well illustrated, and as well edited. While these many interesting and, some of them, very important articles have appeared in various medical journals during the past year and are therefore elsewhere available, it serves a useful purpose to bring them thus together. Volume by volume, these classified medical essays and reports, make attractive reading and are welcome, for reference, on the physician's book shelves. It is of passing interest to note that this year the words "St. Mary's Hospital" disappear from the title page and cover of the book.

Books Received.

A Text-Book of Radiology. By EDWARD REGINALD MORTON, M.D., C.M. (Trin. Tor.), F. R., C. S. Ed., etc., Past President, Section of Electrotherapeutics, Royal Society of Medicine, in Charge of the x-Ray Department, West London Hospital, etc., etc. With 26 plates and 72 illustrations. New York: E. B. TREAT & COMPANY, 1915. Price, \$3.00.

Radiography, X-Ray Therapeutics and Radium Therapy. By ROBERT KNUX, M.D. (Edn.), M. R. C. S. (Eng.), L. R. C. P. (Lond.), Hon. Radiographer, King's College Hospital, London, etc., etc. With 64 plates, 246 illustrations in the text and a frontispiece in color. New York: THE MACMILLAN COMPANY, 1915. Price, \$8.00.

Human Motives. By JAMES JACKSON PUTNAM, M.D., Professor Emeritus, Diseases of the Nervous System, Harvard University. Duodecimo; 179 pages. Boston: LITTLE, BROWN & Co., 1915. \$1.00.

The Meaning of Dreams. By ISADOR H. CORIAT, M.D., Instructor in Neurology, Tufts College Medical School. Duodecimo; 194 pages. Boston. LITTLE, BROWN & Co., 1915. \$1.00.

Progress in Surgery

A Résumé of Recent Literature.

The Operative Treatment of Carcinoma of the Esophagus. FRANZ TOREK, New York. *Annals of Surgery*, April, 1915.

Though surgical removal of carcinoma of the esophagus has been proved possible within the last two years, nevertheless, too few cases reach the surgeon early enough in the course of the disease where operation is feasible. Inability to swallow is, as a rule, the solitary symptom which brings the patient to the physician, and this is a late symptom. However, there are cases which are amenable to surgical removal of the involved esophagus and for these cases, Torek holds, his method of operation promises best results.

He performs a preliminary gastrostomy; this permits feeding to improve the patient's condition—also at the time for gastrostomy the abdomen is thoroughly explored for metastases. Subsequently, preparations are made for attacking the esophagus neoplasm. The line of incision is outlined with silver nitrate—on the left side from the posterior end of the seventh intercostal space, between the angle and the tubercle of the rib, the incision is then carried upward to the third intercostal space. Torek uses one-half per cent. novocaine solution for this step. Anesthesia is now maintained by intratracheal insufflation. The pleura is opened along the extent of the seventh intercostal space. If the condition is an operable one, the external incision is completed by dividing the seventh, sixth, fifth and fourth ribs between their angles and their tubercles, also the intervening intercostal muscles, vessels, and nerves. A rib spreader placed between the seventh and eighth ribs is pulled apart and the whole left pleural cavity exposed. The lung is thoroughly freed of adhesions, kept partially inflated and laid over toward the front part of the mediastinum. The pleura over the esophagus is divided and the esophagus lifted out of its bed; a tape is drawn through underneath it. The esophagus is liberated, divided so as to permit about 3 c. m. excess for invagination of the lower stump; the esophagus is freed from the aorta by blunt dissection; when the upper thoracic aperture is reached a finger is carried into the neck and, under its guidance, an incision made through which the esophagus with the tumor is brought out. The chest wall is now closed, strong silk sutures are placed around the ribs to approximate them; catgut is used for the muscles. The lung is now inflated and the outer wound made air-tight.

The esophagus with the tumor portion from it is held down on the chest wall and an incision made at a point corresponding to the esophagus neoplasm is ablated. The skin is undermined, the esophagus drawn through. The tumor is removed, the neck incision closed, and the lower end of the esophagus sutured to the skin. A rubber tube connects the esophagus from this opening to the gastrostomy aperture. Food can, therefore, be swallowed, it passes through a portion of esophagus, then through the rubber tube and into the stomach.

This operation by Torek, successfully performed in one case by the author, is a rational attempt at radical removal of carcinoma of the esophagus.

Observations on Myeloid Sarcoma, with an Analysis of 50 Cases. M. J. STEWART, *Lancet*, November 28, 1914.

This is an excellent clinical and pathological review of the subject.

Myeloid sarcoma is locally malignant only and does not undergo dissemination. It is to be clearly distinguished, both clinically and pathologically, from malignant giant-cell sarcoma, in which death with visceral dissemination is the rule, even after the most radical operative treatment. The histological diagnosis is based on the morphological characters of the giant cells, especially as regards their nuclei. In myeloid sarcoma the latter are numerous, uniform, small and without mitoses; in malignant giant-cell sarcoma they are few, sometimes single,

irregular, and often very large, while mitotic figures are frequent. The author advances a strong plea for the conservative treatment of myeloid sarcoma. He advocates thorough curettage as the operation of choice in the first instance in suitable cases; failing this, a local resection of the growth. Amputation should be the last resort, and only after the failure of less radical measures. An accurate histological investigation of the tumor is in all cases essential.

Extension of the Limits of Operability of Recurrent Carcinoma of the Breast. CARL BECK, Chicago. *Journal of the American Medical Association*, May 22, 1915.

Beck recommends a more extensive operation than has been used in cases of extensive recurrent and hopeless cancer of the breast. The only thing generally thought best to do is to apply Roentgen rays or Coley's fluid and morphin. In the course of the last few years he has been able to save a few such cases by the operation of exarticulation of the whole shoulder girdle, including the clavicle, arm and scapula, with the plexus and vessels of the infected side, and the ribs, should they seem invaded by the carcinoma. This method may have been used elsewhere, but the procedure is not common, and its publication may be of value. A definite plan cannot be prescribed in detail. The individual case must be considered. It is a delicate as well as an extensive operation, and attended with great shock to a person who is not often in the best condition. "On the whole, however, it begins with the formation of a large skin flap destined to cover the whole area of the defect, the exarticulation of the clavicle following, then dissection of the tissues of the neck and axilla in one block, ligation of every vessel as it is reached, cautious cutting on one nerve after the other, and lastly, the separation and excision of the scapula. Altogether, I have done this operation eight times in nine years. All cases were desperate; some of the patients operated on several times by myself or others, were all considered inoperable, some of them having consulted the best operators of the country, who declared surgical operations useless." The cases are reported, and two practical recoveries have been obtained, while another patient did well for three years before she was lost sight of. While the results are not ideal, they were good considering the desperate character of the cases, and the most important point of all seems to Beck to be the fact that there is some hope even in these most hopeless cases, when surgery is carried to its limit.

The Treatment of Benign Papillomata of the Urinary Bladder with High Frequency Currents. EDWIN BEER, New York. *Annals of Surgery*, June, 1915.

Although Beer has used this new method for destroying bladder tumors only since 1910, a wide experience enables him to state that this procedure is of decided value. It is of primary importance to ascertain if the vesical growth be benign or malignant; malignant neoplasms are not amenable to this type of treatment. The benign growths yield readily to the high frequency current. Where the diagnosis is in doubt at cystoscopy Beer insists upon the removal of a specimen of the tumor for microscopic study. A pathological report of malignancy excludes the cases from treatment with high frequency currents.

The Oudin or unipolar current is preferable to the d'Arsonval or bipolar current, since the former possesses the quality of explosive action which, in a great measure, prevents the attachment of the treated tumor by its more or less dead pedicle; moreover, the Oudin current has a more marked focal action at its point of application and a less marked distant action; it is also more perfectly controlled.

The author's conclusions are:

(1) Results with high frequency cauterizations have been satisfactory.

(2) Malignant tumors can usually be recognized by considering the evidence obtained at cystoscopy, the response to cauterization, from palpation, and from a microscopic study of excised and voided specimens.

(3) All malignant tumors should be excluded from this therapy.

(4) The Oudin current is preferable.

(5) The large size of a papilloma is no contra-indication to the use of this treatment.

(6) Inaccessibility, traumatic severe hemorrhages due to the introduction of the cystoscope, intolerance of the patient, and malignancy are the important contra-indications.

(7) The end results are very satisfactory. Beer's original cases are well over 4 years.

Ovarian Fibroids; with Report of Six Cases. ALFRED M. HELLMAN, New York. *Surgery, Gynecology and Obstetrics*, June, 1915.

The author concludes that the etiology of these rare tumors is still obscure and unsettled. The anatomical origin is variable. The symptoms are those of a tumor of the adnexa, and the diagnosis of fibroid of the ovary can be made only at the operating table. The treatment is operation. The prognosis is good. The tumors can best be classified as fibroma with and without ovarian rests. The pathology is variable from very small to very large. These tumors are, as a rule, hard and irregular, but may be cystic. They may undergo very many forms of degeneration, of which fatty degeneration is probably more common than usually noted. To call a given ovarian tumor a fibroma there must be a definite regularity of the individual fibrous or muscular cells and strands despite all other irregularities.

Some Observations on Bone Transplantation. DEAN LEWIS, Chicago. *Surgery, Gynecology and Obstetrics*, June, 1915.

Experimental and clinical work demonstrates that the compact bone in a bone graft is gradually absorbed, that it is replaced by new bone formed from the periosteum and endosteum of the graft. The periosteum of bone into which the graft is inserted also plays an important rôle and should be saved and brought into contact with the periosteum of the transplant or over its ends. The viability of bone grafts is especially well indicated by their reaction to infection, for involucrum and sequestrum formation occurs in infected grafts or in those placed in infected areas as it does in normal bone. Bone grafts placed in cavities, resulting from curettage of central giant-cell sarcomas or fibrous osteitis, will not survive in most cases, for the hematoma which occurs within the cavity prevents vascularization of the graft. The cavities can be closed most satisfactorily by a bone plug of some kind.

The inlay graft in the treatment of old ununited or recent fractures is more satisfactory than the intramedullary splint. Compact bone dies in the graft because of its physical properties, which do not permit of rapid permeation of serum. The best bone graft contains enough compact bone to give form and maintain fixation and also contains periosteum and endosteum from which the compact bone is substituted. Grafts taken from the anteromedial surface of the tibia are to be preferred to those taken from the crest.

Misapplied Bone Surgery. H. A. WILSON, Philadelphia. *New York Medical Journal*, April 17, 1915.

This is a strong polemic against the present "craze" to operate upon bones and joints. He believes that many of those newly devised operations, while ingenious and conceived in all sincerity, are unnecessary in the majority of instances, are attended with considerable risk, and frequently lead to a worse result than may be obtained by the older conservative methods. He concludes as follows:

1. Operations are rarely necessary in cases of fractures that have been treated on scientific principles from the onset.

2. Before operating for non-union, definite radiographic information should be obtained concerning the presence of callus, as well as that of bone atrophy involving the fractured bone or neighboring bones.

3. Bone transplants, or other operations for securing

ankylosis, are not applicable to the early stages of bone tuberculosis, when functional recovery may be obtained with the control of the pathological process.

4. When it becomes apparent that the pathological process has proceeded to an extent beyond the possibility of functional restoration, ankylosis may be secured by either the brilliantly conceived Hibbs operation or that of Albee of broader application.

5. Ankylosing methods do not cure the bone tuberculosis, and therefore they must not be relied upon solely, but must be associated with prolonged fixation and other accepted methods of treatment.

6. Before resorting to any operation, except in an emergency, a consultation should be held, preferably with the attending internist.

7. When operative procedures are finally determined upon, the patient should be told the truth, the whole truth, and nothing but the truth, concerning his operation. If this information were reduced to writing and duly signed by those participating in the consultation, the total number of operations might be reduced, but the impressions that patients often appear to entertain in regard to the functional results obtainable would be removed.

Simultaneous Fracture of Both Femurs. ALBERT VANDER VEER and EDGAR A. VANDER VEER, New York. *Annals of Surgery*, June, 1915.

This case report is of interest in that within a few hours after the injury both limbs were promptly treated—the right comminuted bone plated, the left comminuted fracture treated by extension and plaster-of-Paris cast—and both types of treatment compared. After nine weeks the patient was out of bed. Skiagraphs then showed a decided bending of the left leg at the point of fracture and that the callus formation was not as perfect as in the right leg. Practically there was no difference in function between both limbs; the left femur was shortened about $\frac{1}{4}$ inch, measuring from the umbilicus.

Empyema of the Thorax; A Critical Study of Eighty-two Cases of Chronic Empyema Sinus of the Chest, Treated at Mount Sinai Hospital, New York, in the Period of Ten Years, from 1903 to 1913. ABRAHAM O. WILENSKY, New York. *Surgery, Gynecology and Obstetrics*, June, 1915.

In 75 per cent. of the patients the cause for the formation of the chronic sinus was present from the very inception of the disease. These can be grouped as follows: Fifty-two per cent. had uncollapsible cavities; seven per cent. had lung abscesses or bronchopulmonary fistulae, or both of these together; fifteen per cent. were tuberculous in origin.

Excluding the tuberculous cases, which present a special problem—that of the cure of tuberculous infection—60 per cent. of the patients owed their chronic sinuses to conditions which were present and were not remedied at the primary operation. The method of operating for acute empyema must permit of a thorough examination of conditions in the chest and the removal or correction of any lesion which tends to the formation of chronic sinuses. The remaining 25 per cent. of the patients owed their chronic sinuses to faults in the after-treatment, which with good care can and should be eliminated.

The Operation of Rib Mobilization in the Treatment of Phthisis. H. MORRISTON DAVIES, London. *British Journal of Surgery*, April, 1915.

Wilms first conceived the operation of rib mobilization for producing collapse of the lung in phthisis when a nitrogen pneumothorax was impossible because of pleural adhesions. This operation gave satisfactory results in the hands of Sauerbruch and the author, the latter found, however, that he could improve upon the operation so as to obtain a greater degree of chest mobility and subsequent collapse and also limit or avoid the usual post-operative shock and pain.

Morrison holds that it is essential to break the rigid arc at the lower path of the chest by dividing the costal margin. Collapse of the chest wall will be comparatively

slight unless this is carried out, however free the mobilization of all the upper ribs may be. He removes enough of the cartilage to leave a gap that shall not be less than $\frac{1}{2}$ inch during the phase of respiration which is accompanied by the greatest degree of approximation.

After a week's preliminary stay in bed the patient is ready for the first stage of the operation. Chloroform in nominal amounts, with Crile's anoci-association anesthesia is the author's choice. The patient lies on the healthy side. Not more than m V of absolute alcohol is injected into the proximal part of the intercostal nerves in the zone of operation. This prevents post-operative pain, makes the field of operation anesthetic to a great extent at the second stage, and permits a good anesthesia to be obtained with a very small amount of chloroform. A vertical incision along the outer border of the erector spinae is carried upward into the neck above the first rib; the intercostal nerves are now injected C alcohol. Subperiosteally 6 cm. of each rib is removed posteriorly. It is advisable to start at the fourth or fifth rib and then work upwards and downwards until eight or nine ribs have been resected. The divided muscles are united, the skin closed with no drainage.

Not sooner than two weeks after stage 1 may stage 2 be considered. Then the patient lies on his back. A vertical incision is made $\frac{3}{4}$ inch from the lateral sternal line extending from above the clavicle to below the costal margin. All the cartilages from the second downward and including the costal margin should be freed and then divided. Great care is needed in excising the first cartilage since it lies close to large vessels. As each cartilage is removed the corresponding part of the chest wall sinks in toward the mid-line; at the completion of this second stage, therefore, there is an immediate and marked collapse of involved thoracic wall.

After neither operation should dressings be changed until the skin sutures are removed. Tuberculin therapy is to be avoided directly before operation and for a long period after operation. Following promptly upon the second stage there is relief from cough and diminution in the amount of expectoration; the general condition shows definite and progressing improvement—the temperature drops to normal, the pulse slows, and the appetite improves. Even under unfavorable conditions, i. e., wasting, secondary infection, and bronchiectasis this two stage operation can produce a marked amelioration. Davies cites two such cases in point.

Gastric and Duodenal Ulcer. The Influence of Operative Procedures on Gastric Motility and Secretion.

WALTER W. HAMBURGER and JAMES J. LEACH, Chicago. *Journal of the American Medical Association*, May 22, 1915.

This is a preliminary study of the post-operative results in a series of gastric and duodenal ulcers with special reference to the effect of operations on gastric motility and secretion, and the value of the procedure as gaged by these standards. After reviewing similar studies by Schuller, Dogacero and others, they give the results of their own studies, based on seventeen cases—nine gastric and eight duodenal ulcers—giving histories and details of the cases. The gastric ulcers are classed in two types: lesser curvature ulcers, four in number, and pyloric ulcers, and the case histories are given. The duodenal ulcers are discussed without protocols and the summary of their discussion is given as follows: "1. Operative procedures on stomachs with normal motility and secretion frequently produce stasis, hypersecretion or both. 2. Stasis may be caused by pylorospasm, by contents stranded below the level of the gastro-enterostomy opening or by contents held between the opening and the pylorus. 3. Hypersecretion may occur coincidentally or secondarily to stasis, but also independently, as a true post-operative hypersecretion, similar to the same conditions in dogs. This hypersecretory period is probably due to operative trauma, and is likely to be temporary. Post-operative hypersecretion explains certain discrepancies between bi-smuth and motor meal findings. 4. Operative procedures on stomachs with delayed motility and hypersecretion usually reduce motility to normal (but not beyond) and lower hyperacidity. This is particularly true if the pylorus is closed. If the

pylorus is left patent, vicious circle, stasis in duodenum, spasm or secondary contracture of the opening are liable to continue the abnormal gastric function or to increase it. 5. Non-relief from surgical interference in gastric and duodenal ulcer is due to (a) lack of properly placed surgical indications; (b) lack of thorough and prolonged pre-operative medical treatment; (c) failure to devise the proper surgical procedure to meet the individual case, and (d) lack of prolonged post-operative medical treatment."

Radium Treatment for Scars. (Ueber die Radiumbehandlung von Karben.) DR. KAMINER, Berlin. *Berliner Klinische Wochenschrift*, May 3, 1915.

Although the literature contains much on the radium therapy of Keloids, very little is said on the treatment of scars with radium. Kaminer has 49 soldiers under treatment. For the present he reports only 10 cases. These were cases of scar formation, causing deformities, marked limitations in normal function of the parts involved, and frequently pain. The exposures varied from 3 to 8 in number, the total time of radium exposure from 16 to 43 hours; about 25 mg. of radium were used. In all the cited cases improvement was marked. No ill effects were observed.

The Early Diagnosis of Gas-Phlegmons by X-ray. (Die Frühzeitige Erkennung der Gasphlegmone durch das Röntgenbild.) LUDWIG FINCKH, Konstanz. *Deutsche Medizinische Wochenschrift*, May 1, 1915.

In gas bacillus infections the severe malignant form offers little hope for saving an involved limb. The milder type of the disease, where an abscess forms about a foreign body with subsequent gas formation, although no surface signs point to the diagnosis of such a condition—here not infrequently early—x-ray may show a well defined zone of air formation and so lead to prompt measures for the recovery of limb and life. In a series of cases among the wounded in war, Finckh became convinced that radiography may be the earliest guide in the detection of gas formation in cases where, at the time of initial injury, the foreign body produced comparatively few symptoms and physical signs.

A New Operation for Fistula in Ano. S. J. BLUMENTHAL. *The Medical Record*, March 27, 1915.

After the anal opening is dilated the fistula is well curetted to remove granulations. A sound is introduced into the fistula to serve as a guide in placing a series of chronic gut sutures which encircle the sound. Each suture is placed $\frac{1}{2}$ inch away from and always concentric with the sound. The very first suture should close off the fistula from the rectum; all the other sutures are left untied and the fistulous tract, which they encircle, is now Paquelinized—cauterizing a small portion at a time. A rectangular hard rubber plate is threaded on the sutures; this acts as a splint and compresses the entire tract when the sutures are tied. The advantages of this operation are (1) the anal splinter is not cut; (2) healing takes place under favorable clean conditions, there being no large, raw area; (3) the fistula is made sterile before collapsing it; (4) the operation is bloodless and leaves no scar.

Congenital Defects of the Anus and Rectum. EDWARD C. BRENNER. *Surgery, Gynecology and Obstetrics*, May, 1915.

The author has collected sixty-one cases. The cases fall roughly into two classes: (1) Imperforations with complete obstruction demanding immediate operative intervention; (2) Those with fistulous openings. In complete obstruction fecal drainage must be established and an outlet supplied that will imitate the natural anus in function and position. Perineal dissection for fistulous openings gives excellent results and is a safe procedure. Inguinal colostomy gives a high mortality and is to be used only as a last resort. Celatotomy combined with proctoplasty promises good results in selected cases. It must not be forgotten that congenital defectives of this kind often present multiple congenital defects, such as stenosis elsewhere in the gastro-intestinal tract, polycystic kidneys, etc.

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No. 9

A STEEL PIN OPEN METHOD OF TREATING FRACTURES.

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It is with no claim of originality that I bring this method of treating fractures before the profession. On the contrary, the *modus operandi* was first used by my colleague, Dr. Larochelle. The results which he obtained appealed to me so much

instruments; even the gloved finger is not permitted to come in contact with it. I believe that Lane has developed the safest technic in this regard. One part which is not perhaps as customary in bone surgery as it will be later, if the foregoing method is used, is the cutting down upon the injured bone the day of injury whenever possible. After the soft tissues are carefully dissected away and the fractured area laid bare, all blood clots, if any be present, are cleaned away by gauze sponges. The bone ends are then dovetailed in as nearly normal form as is possible. A hole is drilled very obliquely

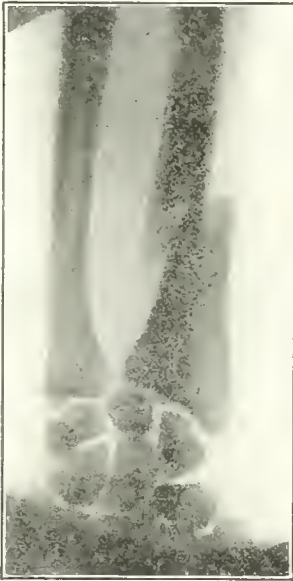


Fig. 1. Case I. Typical Colles fracture. Upper fragment driven into lower. Marked displacement.

that I felt that the idea was worthy of consideration by the surgical profession.

The method is simple, yet very effective. It has the one marked advantage over other methods in which metal retentive material comes in contact with the bone, that when reconstruction is complete, no metal remains to act as a foreign body. Lane plates have this disadvantage, that they are left to act as a foreign body after the completion of their usefulness. The material used in this method is entirely withdrawn after a certain period.

Operative Technic.—The fracture is cut down in the usual manner, and the Lane technic is carried out in every detail. The bone is touched only by

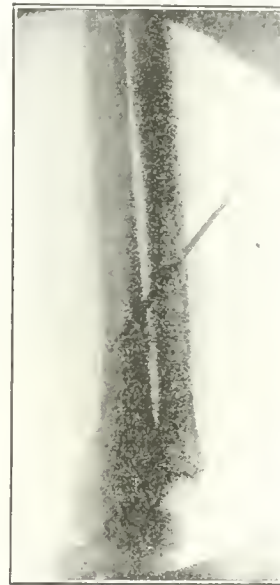


Fig. 2. Case I. Fragments aligned. Pin in place.

through the two fragments. After the proper depth is reached the drill is withdrawn while the fragments are carefully held in place by a bone clamp. A steel pin of the proper size is driven through the drill hole by a specially constructed steel hammer so as to prevent slipping or an angular blow. This is a very important point, because unless it is adhered to, the pin will not be solidly placed or the bone may be cracked. If either of these, especially the latter, happens, the whole operation is fruitless.

This pin should be long enough so that about two inches protrudes beyond the skin surface. Following the proper adjustment of the pin, which

should be of the proper length, so that when the closure is completed the pin will not bear against the skin edge, the muscle and fascia are sewed over the bone. The skin incision is closed in the usual way. If undue pressure of the pin against the skin edges is permitted, the result may be a pressure necrosis of a limited degree, yet enough to prevent a good cosmetic result. Also continued irritation may cause induration with resulting thickening. Neither of these results will occur if one is painstaking while closing the wound.

When the wound is closed, a properly adjusted splint is applied. I use the fiber splints whenever possible, as these may easily be moulded to the parts, and as they permit of frequent inspection of the wound without disturbing the injured member.

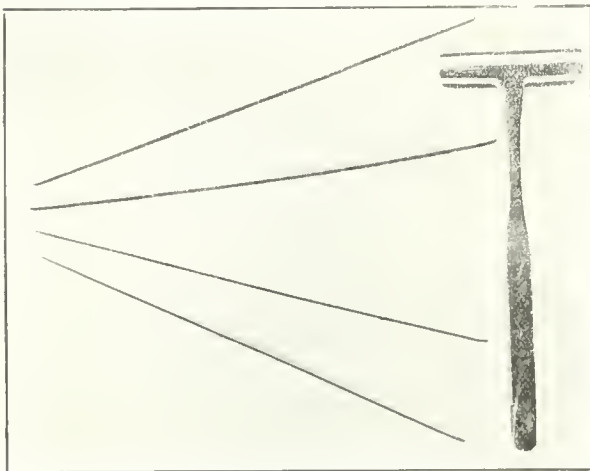


Fig. 3. Steel pins and hammer. The hammer is of solid steel with crenated face to prevent glancing blows.

Gauze dressings are so adjusted about the extending end of the pin as to completely cover it and at the same time protect it from injury. The pin is left *in situ* for three weeks and then carefully withdrawn by using a pair of steel pliers and pulling in a direct line with the pin. This pull is steady, and generally the pin can be withdrawn without great difficulty. In one case, of which the illustrations are shown, a small portion of the distal end of the pin was left behind. This does no great harm, yet it fails in what is most desired—that no foreign material be left behind after the three weeks' period. The usual strict aseptic post-operative care is given these cases as in any open treatment of fractures. The pin method herein described does not appear to shorten the convalescent period, but it has advantages which will later be cited.

In order to illustrate the steel pin method, I have selected three typical cases, one involving the forearm, one the lower limb, and a third the hip. I

have selected these cases which were operated upon within twelve hours of injury as fully illustrating its use in three widely distributed locations.

CASE I.—Referred by Dr. N. B. Webber. M. Y., 26 years of age, entered the Notre Dame Hospital, December 12, 1914. One hour before, while he



Fig. 4. Case II. Complete transverse compound fracture of tibia and fibula. Marked displacement and overriding.

was cranking his automobile, the machine back-fired. His arm became disabled and he was at once brought to the hospital. He had a typical silver-fork deformity of Colles' fracture of the

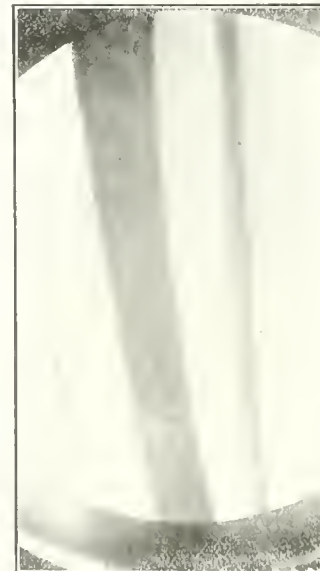


Fig. 5. Case II. Note perfect alignment. Four weeks after operation. Arrow indicates level of fibula fracture.

right forearm. A radiograph of the injured part showed the typical driving of the upper segment of the radius into the lower at a point about $2\frac{1}{2}$ inches above the wrist joint (Fig. 1). Immediate open treatment was accepted by the patient.

A clean-cut oblique fracture was found with some slight impaction, but no blood clots and practically no bleeding. The steel pin method was used and the part put up in a palmar fiber coaptation splint. The pin was left *in situ* fourteen days, and then withdrawn. The splint was used for one week more, and then the patient was discharged in supporting bandage and interrupted use of sling for one week more. The results of this method of treatment in this case are shown in Figures 2 and 3, the second showing the pin *in situ*.

The end-result was perfect functional ability.

CASE II.—Referred by Dr. G. S. Bailey, Hillsboro, N. H. Miss M., 26 years of age, entered the Notre Dame Hospital, January 6, 1915. The even-

ends were dovetailed into practically normal contour, spicule for spicule, and the steel pin driven home through the tibia. A posterior plaster cast was applied, extending from a point two inches beyond the ends of the toes to the gluteal fold. The splint was permitted to extend beyond the ends of the toes for a distance sufficient to support the bed clothing and thus make it more comfortable for the patient by eliminating the usual cradle. The pin was withdrawn at the end of three weeks, and for three weeks thereafter the part remained supported by the splint alone. This was then dispensed with, a bandage applied, and the patient gradually worked into crutches. At the end of eight weeks she was discharged, walking fairly well, with some conser-



Fig. 6. Case III. Complete oblique fracture of surgical neck of femur. Note impaction and deformity.

ing before, while coasting, as she was walking up the hill, a double runner well loaded and coming down the hill at full speed struck her midway between the ankle and knee. There was immediate disability. She was conveyed to her home, where she was examined by Dr. Bailey, who found marked angular deformity of the right leg in the middle third. A wound the size of a lead pencil led down to the point of injury, thus compounding the condition. Dr. Bailey diagnosed the injury as a complete, double, transverse, compound fracture of the right tibia and fibula in the middle third. There was free motion, much crepitation, and total loss of function. The part was neatly put up in a temporary posterior, improvised splint dressing under aseptic precautions, and the patient was brought to the hospital early the following morning. After entrance to the hospital the part was radiographed with the result shown in Figure 4, bearing out Dr. Bailey's diagnosis. Practically no swelling or ecchymosis was present. Immediate open treatment was advised and consent was obtained.

The few blood clots which were present were removed with gauze sponges. The spiculed bone



Fig. 7. Case III. Steel pin in situ. Better reduction, manually, impossible. Good function apposition.

vatism, more due to apprehension than to any physical disability.

End-result: Perfect approximation, good union, function progressing well toward normal (see Fig. 5). Unfortunately, the part was not radiographed while the pin was *in situ*. On April 6, 1915, Dr. Bailey informed me that the patient was using the limb very well.

CASE III.—Referred by Dr. W. L. Biron. Miss L., 23 years of age, entered the Notre Dame Hospital, January 14, 1915. One evening she slipped on the icy walk, falling and striking heavily upon her left hip. There was immediate disability and loss of function, accompanied by more or less pain in the left hip. Removed to her home, Dr. Biron recognized a fracture of the surgical neck of the femur. She entered the hospital the following morning. Marked crepitation, four inches of shortening, inversion of foot, marked camel hump, deformity of left hip, great trochanter only a little higher than Nelaton's line, marked pain in hip upon passive motion. The diagnosis of oblique fracture of the surgical neck of left femur was confirmed by radiograph (Fig. 6).

The hip was cut down upon by the Murphy goblet incision to allow free access to the part. The few blood clots present were removed with gauze sponges. Under continued traction by assistants upon the leg, the spiculed ends were brought into

free for inspection. A two-part cross wire cradle was meshed into the cast over the toes to protect them from the bed clothing. The cast was then windowed over the site of operation; and the patient returned to bed in very good condition. At

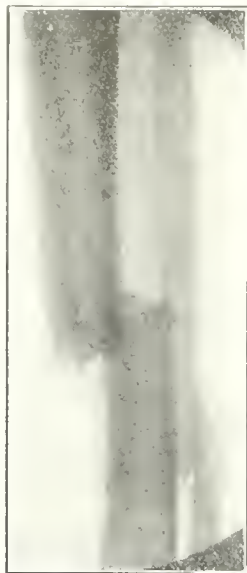


Fig. 8. Fracture of tibia and fibula.

as near perfect apposition as possible. It was quite impossible to bring the fragments into anything like normal position because of the massive musculature of the surrounding parts. The steel pin

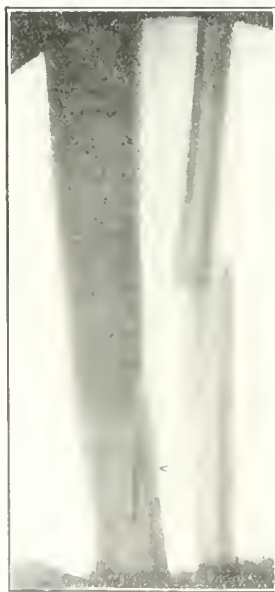


Fig. 9. Same case as Fig. 8, four weeks after injury. Fragment of steel pin broken off through faulty technic in withdrawing.

was then driven completely through the femur, holding the parts firmly. The wound was closed in the usual manner, properly toileted, and a thick gauze dressing applied. The trunk, hips, and left lower limb were thickly padded with sheet wadding and a spica plaster cast applied, leaving the toes

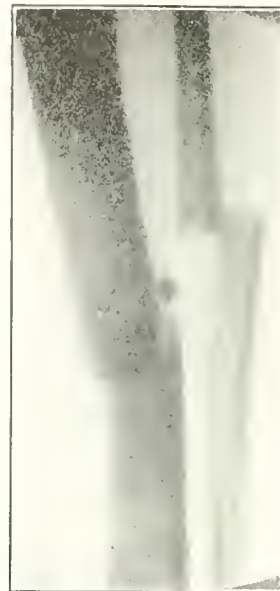


Fig. 10. Transverse fracture of tibia and fibula with slight comminution.

the end of three weeks the pin was withdrawn (see Fig. 7, showing steel pin *in situ*). The cast was left on for six weeks. A Leonard fracture bed was used for this case in order to facilitate the toileting

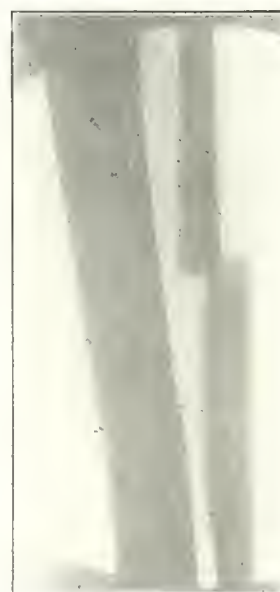


Fig. 11. Same case as Fig. 10. Four weeks after injury. Steel pin has been withdrawn. Perfect alignment of tibia. No surface deformity.

and posing of the patient, and thereby give much comfort which otherwise would not be enjoyed. This also greatly reduced the liability to melancholia which is sometimes seen in these long-drawn-out cases. After the cast was removed,

massage and very gradual passive motion were begun. Later the far-reaching method of Cotton, assisted active motion, was begun. Later complete active motion was induced and the patient worked into crutches with a high soled shoe on the right foot. Progress was kept up until at the end of three months she was allowed to bear her weight upon the part and begin real walking.

The end-results were full function of hip joint, one-inch shortening of the affected limb; gradual return to normal function by a slight accommodation tilt of the pelvis.

The accompanying illustrations of cases not re-

conditions, especially where diseased bone is present, as is the Albee method. Undoubtedly, however, the steel pin method will work best many times when other methods fail. The following are some of the advantages of this method:

1. No metal is left in contact with the bone for any length of times.
2. There are no screws to loosen.
3. No foreign body is left behind.
4. There is very little danger of loosening or breaking the pin.

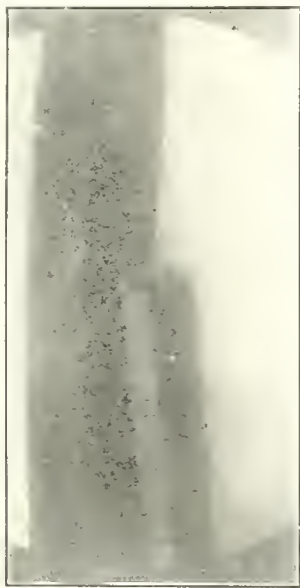


Fig. 12. Transverse fracture of tibia and fibula. Four weeks after injury. Steel pin has been withdrawn.

ported show marked deformity at the time of the fracture, and the end-results. Illustrations Nos. 8 and 9 show a complete double fracture of tibia and fibula. These are shown for the purpose of exemplifying a case where the distal end of the steel pin broke off and was left *in situ*, while no special harm resulted. Illustrations 10, 11 and 12 show displacement at the time of fracture, and the end-results. When both tibia and fibula are involved, the tibia alone is pinned, the fibula being reduced by dovetailing and thus held in place. Illustration No. 13 shows the end-result of a fracture of the femoral shaft, and is given merely to illustrate the good linear end-result in these cases.

To sum up this method, I believe that no other method gives as good results except possibly that of Albee, who has acquired such skilled craftsmanship by bone inlay and bone pin work. Although Albee deserves great credit, yet his instruments are expensive, and in some communities this is a drawback. The steel pin method certainly gives equally as good results, but is not as applicable to some

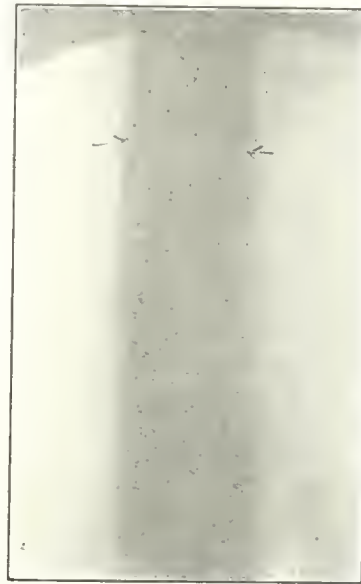


Fig. 13. Transverse fracture of femur. Steel pin has been withdrawn. Perfect alignment and union with no callus. Arrows indicate line of fracture.

5. No secondary operation is necessary.
6. The operation may be done on the day of injury, and convalescence is thus materially shortened.
7. The steel pin acts as a drainage vent.
8. The periosteum is not disturbed.
9. Early operative procedure is possible, so that there are no blood clots or hemorrhages.
10. The operative time is shortened.
11. Exposure is shortened.
12. Cotton's method of early passive, assisted active and active motion may be used.
13. There is no very slight swelling of the soft tissues.
14. There is minimum callus formation, and many times there is no apparent edema or induration.

THE TEACHING OF OBSTETRICS TO NURSES: HOW EXTENSIVE SHOULD SUCH A COURSE BE MADE?

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Having had the pleasure of lecturing to the nurses in the training school of the Grant Hospital for a number of years, I have had occasion to make a number of observations relative to the work done by our nurses after graduation and also to compare the work and obstetric knowledge of nurses graduating from other schools.

While I do not wish to appear as criticizing other schools or their teachers nor to cast any reflection upon the work of graduates of other schools, it has seemed to me that some discussion of this subject might not be out of place in advance of the general application of the new nurses' law in Ohio.

To my mind, the main point of contention seems to be whether we desire to give instruction of such quality and quantity as to make good obstetric nurses or to prepare these women to assume the duties of the nurse and doctor combined. It seems to me that many of our training schools are giving instruction more suited for medical students than for nurses. The nurse has her field and the doctor has his. Each has his specific duties in obstetrics. The gist of my argument is that we should make good obstetric nurses and not poor obstetricians. If the doctor is so busy that he must rely upon the nurse to make all the preliminary examinations and perform all the other duties except collecting the fee, he should send an assistant or refuse to take more engagements than he can care for properly. I am willing to assume that many nurses, experienced as well as graduated (and all the good obstetric nurses are not graduates), are better prepared to handle confinements from start to finish than some doctors, but think that this is no reason to educate nurses to do what the accoucheur should do. Would it not be better to educate the medical men?

There seems to be a humorous side to all pathetic things. We are continuously trying to teach the profession that puerperal sepsis is almost always avoidable and to teach the laity to demand aseptic midwifery. Are we then consistent when we preach abstinence from vaginal examinations and at the same time direct the nurse to make such examinations at frequent intervals and report the progress of the labor? Is this not a common type of meddlesome midwifery? Of course, such technic

furnishes a scapegoat in the nurse should the patient later show signs of infection. Some obstetricians will say that their nurses make rectal examinations, but I offer the same objection.

What shall we teach our nurses; what should a good course consist of? My ideas are as follows:

In view of the fact that so many nurses refuse to take engagements for obstetric service, I think that we should first of all impress upon them that obstetric nursing is the highest type of service. I am in the habit of dwelling upon the importance of this work so that the pupil nurse will not set her mind against this service before she is mature enough in her training to know what she is thinking about. I impress them with the fact that nearly all surgery is now done in hospitals with pupil nurse attendance; that typhoid nursing will soon be relegated to ancient history by the improvement of municipal water supplies and by vaccine; that pneumonia and the various zymotic diseases will soon be either prevented or quickly cured by the use of sera; that contagious diseases will soon be treated in special hospitals and the patients will be obliged to go to such hospitals by command of law. Then what will be left for the trained nurse to do? Obstetrics. I must confess that society is assuming habits which may seem to bely this statement, but I am sure that our birth rate will always be large enough to afford an income to such nurses as are worthy of hire.

The nurse should then be told the qualifications of a good obstetric nurse. (These qualifications can be applied to nurses in any line of work.) She should be taught tact, loyalty to the doctor, politeness, kindness, cleanliness, willingness to assume any emergency duty in the household, the danger of making diagnoses and prognoses, and above all that *human sympathy* is the most important attribute of a good obstetric nurse. She should be impressed that she is caring for a woman in the most trying and important time of her life and that the peculiar bond of feeling between woman and woman is here most evident and necessary. That is why we have women for obstetric nurses. Tell her that no accoucheur likes to have a nurse who tells all about her bad cases; or a domineering nurse; or a soft nurse; or a poor reader; or one who talks too much or too little; or a diagnostician nurse; or one who is too familiar; or one who is vain, or conceited, or too humble, or sloppy; or one who says that she comes from a fine family and works only for the love of it, while the head of the house hustles to raise twenty-five per week to pay her; or one who quarrels with the servants.

The pupil nurse should have an *elementary* idea of the anatomy and physiology of the female reproductive organs and their relation to conception, gestation, parturition, and the puerperium. She should be instructed about menstruation and ovulation and their relation to each other. She should also have elementary lectures concerning the various commoner affections of the pelvic organs, especially gonorrhea, syphilis, and allied venereal conditions.

To ask her to learn all the histology, physiology, and pathology of these parts and their relations to child-bearing, such as is generally taught to medical students (and forgotten by them) is absurd. If they desire they may read any of the standard text-books at their leisure.

Many beautiful examples, such as the fertilization of the flowers and trees, may be cited to explain in a simple manner the theories of insemination and fertilization. Thus, abstruse theories may be avoided and the pupil given a chance to hear something which she can remember.

Asepsis and antiseptics should be drilled into the student in all branches of her work. But nowhere is it so important as in the study of obstetric technique. It is also well to practise what you preach when you demonstrate in the maternity or in the home. The nurse should be taught how to cleanse her hands. I do not feel that I have done my duty until I have taught my students at least three approved methods of cleansing the hands. It is easy for a nurse to cleanse her hands in the hospital where everything is ready for thorough scrubbing and plenty of antiseptics are at hand. But how about the homes, rich and poor, where she is without all these refined aids to asepsis? How often have I seen a nurse who was excellent in the hospital completely at sea when she attempted to make the aseptic arrangements for a home confinement. It is not at all necessary that a student nurse should be burdened with an advanced course of bacteriology in order that she may be capable of using a rice straw brush and a bar of soap to the best advantage. It is this type of "over-education" that makes them forget the commonsense way of doing things.

In order that she may know what every woman ought to know, I think that the pupil nurse should be taught the signs of pregnancy and their relation to the menses, breasts, and vagina. She should be told about the nausea and the vomiting and the commoner anomalies of early gestation. It is well for her to know the various prophylactic methods of securing comfort to the parturient woman. I am in the habit of telling my pupils about the various nostrums concerning which expectant mothers

will ask them and explaining to them the uselessness of such things. I tell them about the pelvimeter and explain pelvimetry to them in a superficial manner. But to expect them to get any benefit from a long discourse on the measurements and planes of the pelvis and the size of the fetal head seems a waste of effort. Besides, what good will it do the mother if her nurse is expert in this branch of obstetrics?

Inasmuch as most women, when engaging a nurse, ask her to enumerate just what she should have on hand, in the way of drugs and baby things, it is well to instruct the student along these lines. Do not fill her mind with your own hobbies and thereby get her into trouble when she nurses for your colleague, but tell her of the things that are generally used in such events. And also caution her that she is not to say, by way of criticism, that she was taught to use so-and-so or that Dr. Blank always uses such-and-such.

In these days of aseptic midwifery, nurses are obliged to carry many more articles of equipment than formerly. I tell them that they are to carry such articles as are absolutely necessary for the carrying out of the doctor's orders, in his absence or in an emergency. But to expect them to carry every article of human comfort and convenience, from a hypodermatic needle to a bed-pan, is asking too much.

On arrival at the home, at the time of labor, a nurse should know how to arrange the room and what to do with the friends and children. She should know how to arrange the bed in relation to light, heat, ventilation, stoves and open fires, doors and the means of securing water and other articles needed in the labor room. She should know how to make the patient comfortable and confident and what to do with herself while waiting for the critical moment. She should know how to prepare receptacles from such stock as she may find at hand in the home, and to prepare such instruments and tables as will be needed. In order that a nurse may know which blade of a forceps to hand first to a doctor, she need not be subjected to scientific demonstrations or complex explanations of the mathematical and mechanical mysteries of the use of these tools.

It is important that she knows that she is to use a rubber catheter and not a glass one, and that she knows how to prepare the vulva before inserting the catheter.

That a nurse should know what to do during the confinement is certain, but that she should be able to anticipate every wish, whim, and hobby of each and every accoucheur with whom she comes in

professional contact is expecting too much. She should be taught the fundamental technic in general use and then allow the doctor under whose orders she is working to give her what he considers the fine points to be used in his service. Here again the nurse is to be cautioned not to refer to her didactic teaching in the hospital.

In the puerperium many unfortunate circumstances may arise, and it is in this period that the nurse must use her training and teaching. She should be taught the care of the new-born. She must know how to care for the breasts and the vulva. She must be able to make such notes and keep such a chart that the physician may see at a glance the exact condition of his patient. She must be taught that the smallest detail is important enough to note on the chart. It is surprising how neatly nurses keep a chart while on duty in the hospital and how slovenly they prepare them while on private duty. This is largely the fault of the doctor because he himself does not insist upon the careful charting that would be such an aid to him in anticipating some adventitious condition. This chart work should be strongly impressed upon the pupil nurse. I have noted that the best charts are kept by those nurses who are the neatest and most reliable in their general work. They should be taught to note the appearance of eruptions and discharges and the related symptoms. It is not necessary that she should recognize the importance of these objective symptoms, as that is the duty of the doctor. It is the duty of the doctor to see that the nurse is capable of seeing these things when they are present. One may thus save himself considerable embarrassment at times.

Regarding such complications as post-partum hemorrhage, eclampsia, and puerperal sepsis, little need be said to the nurse. If, as I said before, she uses her eyes, and then promptly reports any untoward symptoms, she has done all that need be expected of her. This might not apply in the case of post-partum hemorrhage, because in this calamity immediate help must be at hand. In this case the nurse herself must, indeed, save the life of the woman. *Every nurse must be taught how to handle a case of post-partum hemorrhage.* But regarding eclampsia, she need only be taught to put something between the teeth to prevent the biting of the tongue and to call the doctor. After that she need only follow the physician's orders. The same in puerperal sepsis. She need not make a diagnosis nor prescribe a treatment. She has only to note the slightest rise of temperature, so that the careful obstetrician will be warned as early as possible. Thus we see that it is not at all necessary to give

our pupils long and tiresome lectures on these subjects. And besides, the first accoucheur they work for will disagree with all you have told them and then they are lost. It is a fact that we physicians do not know very much about some of these conditions, especially eclampsia.

It is well to teach a nurse how to handle an emergency delivery. She may be caught with a case before the doctor can get to the house and be forced to deliver the woman by herself. But let us remember that nature is very kind and that "a little knowledge is a dangerous thing." The nurse who knows how to grasp the uterus and to put a clamp on the cord, or tie the cord, will be safer than one who thinks that she is a fair obstetrician.

In view of the foregoing it might be assumed that I am of the opinion that we are teaching our nurses too much, or that I do not believe in thoroughly equipping our nurses for this important service. If anyone has formed such an opinion I beg to state that such is not the case. I believe that we should raise our standard of obstetric nursing to the highest point possible. But my contention regards the method of attaining such perfection. I do not think that we should stuff our nurses full of knowledge that is intended for those who contemplate the practice of medicine. We should aim to teach them such things as will make of them valuable assistants to the accoucheur, and careful and observant attendants for the parturient and puerperal woman. The sweet and kind womanly attributes of these attendants will be of more benefit to our obstetric patients than a head full of technical knowledge. I think that we should give such instruction as will enable nurses to combine the mother instinct with the trained hand and eye. The obstetric nursing service is of woman to woman. Do not spoil a good nurse to make a poor obstetrician.

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THE USE OF BONE GRAFTS.

Congenitally small members can be enlarged by severing the bone with a saw and wedging the fragments apart by inserting a suitable bone graft and fixing the graft by the proper means. Absent head of the femur can be replaced by the head of the astragalus; absent fibula substituted by grafts from the tibia, small inferior maxilla enlarged by the insertion of a piece of rib, et cetera. The acetabulum can be enlarged by pegging a graft to its upper surface, or new shelves for dislocated femora made by the same method.—W. G. STERN in *The Cleveland Medical Journal*.

THE VALUE OF THE ORGANIZATION AND INSTRUCTION OF FIRST AID CORPS ALONG RAILWAY LINES.*

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When I entered upon my duties with the New York Central Company at West Albany two and a half years ago, I soon noticed, and thereafter became forcibly impressed with, the lack and decided need of an organized and well equipped first-aid department.

I learned from personal investigation that, although there were between four and five thousand men employed in the shops and yards, less than a dozen understood first-aid work even to a small degree.

I was informed that some years previously a certain employee, then no longer in the employ of the company, had gained quite a reputation as a first-aid worker, and upon the memory of him seemed to rest all that was left of first aid.

The general opinion was that an organization of men trained for emergency treatment of injured fellow workmen was not only something to be desired, but was absolutely necessary. It had happened that, in many cases, infection developed in small wounds due to neglect on the part of the employees and their ignorance of the importance of careful attention to them.

Also men came to me almost daily to ask if I could do anything to remove ugly scars that had resulted from wounds which had been crudely dressed with wads of cotton and bound up with anything that happened to be handy from a handkerchief to a stray bandage which a fellow workman happened to have in his pocket.

Frequently the men would decide for themselves that an injury did not amount to anything, with the result that a week or more later I would be called to attend a wound in which all the symptoms of infection had developed; or possibly a badly swollen hand or foot in which a fractured metacarpal or metatarsal was discovered.

I remember one workman who was struck on the nose by a flying rivet and thought the injury of little consequence until ten days later when he came to me, saying that he could not breathe very well through one nostril and something seemed to grate in it. I found a fracture.

"I did not think it amounted to anything" was the usual explanation of men in whose neglected injuries infection had developed. Others, espe-

cially foreigners, quietly departed to their homes without making any report of injury, and nothing was heard from them until an attorney appeared with a claim on their behalf.

Malingering and a desire for opportunity to sue the company had become too prevalent. As a rule the first question asked me was not, "Am I badly hurt?" but, "Do you think I will get any money from the company?"

These circumstances and others indicated want of cordial understanding and intelligent cooperation between the men and the company surgeon's department.

There was manifest need of impressing upon the minds of the workers the fact that the company surgeon was their friend, like themselves employed, charged with the special duty to give them prompt care when accident might befall them, and always ready and eager to perform that duty. It seemed reasonable to me that this could best be done through men selected from the employees themselves, who had the good will and confidence of their associates, and could be trained to serve efficiently during that often critical time before the doctor can arrive.

A meeting was called of all those interested in first-aid work. There was a good response and those who came took up the work with eager willingness. A few men were picked from each shop and the yards and a first-aid class organized.

Regular meetings were held and the men instructed and drilled in the different details of first-aid work. The members elected two officers known as *chief first-aid men*, one for the upper department and one for the lower, to whom any questions regarding cases or conditions might be brought.

In order to prevent many workmen crowding about an injured man, all offering different suggestions as to treatment, it was made known throughout the shops that the official first-aid men would wear a service button and that they were to be the only men to be called upon to care for the injured before the surgeon's arrival and that their directions were to be carried out without question.

So the first-aid work has been for some time well systematized. When an employee is injured, while word is being sent to the surgeon's office, the first-aid men give him such emergency treatment as may be necessary. If his injury is severe, he is removed to the emergency operating room which the company has constructed and equipped in the shops. There first-aid men prepare instruments and appliances that are likely to be required according to instructions which they have received.

*Read at the 24th annual session of the New York and New England Association of Railway Surgeons.

The members of the first-aid corps take keen interest in their work, and are proud of their position, and their fellow employees highly appreciate their services.

Recently the manager of the restaurant in the Albany depot asked if he might not be permitted to join the corps, as he had heard of its work and felt that the restaurant ought to have a representative. Of course, he will be made a welcome member. It is my firm belief that the various railroads should encourage the company surgeons to pick representatives not only from employees in the shops and yards, but also from station employees and train crews for instruction in first-aid work, so that emergency assistance may be readily available wherever even the remotest possibility of an accident exists.

One of the great indirect values to be gained from the extension of this work is to the workmen, who are constantly reminded by first-aid men that "Safety First" is to be thought of always. To give such admonition is part of the work of the members, as I have impressed it upon them that they can do even more good by making their comrades careful to avoid injury than by caring for them after they are injured.

The men have been taught never to neglect even a seemingly slight injury, and never to apply or permit to be applied to a wound a surgically unclean cloth, but to go directly to or call for a first-aid man who knows what to do and has the proper materials. In cases of serious injury the intelligent work of a first-aid man may avail to save a life during the short time that it takes the surgeon to reach him.

The value to the company of this service is manifold. It strengthens loyalty, since the men are made to feel that their welfare is a concern of their employer. It minimizes the duration and may in some instances serve to diminish the extent of disability. It prevents malingering.

The value to the surgeon is best known by one who has found himself suddenly placed in a situation where none but untrained hands have cared for his patient until his arrival. In many instances just a little instruction in the use of willing but untrained hands would have been a godsend to the company surgeon for the success of his after treatment. To know that in case of injury to any of the men placed under his care there are always immediately ready those who know what must or can be done to mitigate the effects is greatly conducive to a surgeon's ease of mind. And it is of great assistance to him to be intelligently informed

about the nature of an injury when he is called, usually by telephone.

While conditions are particularly favorable for the establishment and maintenance of a first-aid system at the great shop and yard centers of which West Albany is one, it should be possible to extend ramifications from those centers along the lines of every railroad system, so that in case of accident anywhere it would never be necessary to go as far for a trained first-aid man as for the nearest surgeon. For all the reasons which are so clearly obvious that they have been but briefly mentioned here, the efforts of all concerned should be concentrated upon the extension of the first-aid service.

CANCER OF THE SKIN.*

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Cancers of the skin offer few difficulties in the way of recognition because, unlike those of the viscera, their location brings them directly under the eye of the observer.

The dermatologist recognizes two main types of cancer of the skin: those that originate in the viscera and affect the skin secondarily, and those that originate in the skin itself. Cancer of any organ may lead to metastatic deposits in the skin. These secondary cancers occur under three clinical forms: (a) the nodular, (b) lenticular, (c) cancer *en cuirasse*. All these forms of secondary cancers are rare because with an actively proliferating cancer of an internal organ the death of the patient usually supervenes before deposits occur in the skin.

In the nodular form, the deposits are located in the cutis under the epidermis and may be felt as firm, round, or irregular nodules over which the surface is movable and normal in appearance. In the course of time the cutaneous deposits become confluent with the epidermis, which may later break down and ulcerate. The nodular form may occur on any portion of the integument, but is most often seen on the upper part of the trunk.

Lenticular cancer is usually secondary to cancer of the breast, and is the result of direct extension from the primary growth by way of the lymphatic channels. It is most frequently seen associated with recurrent cancer of the breast after operation. The nodules are pea-size, hard, and shining, with a waxy reddish or bluish-red color. In can-

*Read before the N. Y. County Medical Society, May 24, 1915, in cooperation with the American Society for the Control of Cancer.

cer *en cuirasse*, we have the same kind of secondary infiltration by way of the lymph spaces, and in addition an involvement of the lymphatics of the skin, so that the entire surface assumes a board-like hardness and is dotted with smooth, shining papules. Itching is often a prominent symptom. The process is always secondary to cancer of the breast, and the view of some authors that this form may arise primarily in the skin is, in my opinion, erroneous; the primary breast tumor may be so small as to escape detection under the tensely infiltrated skin. The cancerous infiltration may involve the greater portion of the thoracic wall, front and back. Edema of one or both arms invariably follows, formidable ulcerations, fungous growths, and crusting may develop, and death usually occurs within a few months, or the patient may survive a year or two.

Primary cancer of the skin—epithelioma—is by no means a rare disease, and there is reason for believing that its frequency is increasing. Among nearly 700,000 cases of skin diseases of all kinds, recorded by the members of the American Dermatological Association, there were 8,768 cases, or about one and one-quarter per cent. of cancerous affections. Dividing the observation period of 34 years into three periods of 14, 10, and 10 years respectively, we find during the first period of 14 years an average of 87 cases of cancer per 10,000 patients; during the second period of 10 years, an average of 109 cases per 10,000; and during the last ten years, an average of 190 cases per 10,000. That is, the incidence of cancers of the skin in dermatological practice has more than doubled in the last period as compared with the first. These statistics, based on diagnoses by trained observers in the larger cities throughout the country, have a distinct value. The disease is more frequent in men than in women, in the ratio of about two to one. Like visceral cancer, it occurs after middle life, though cases have been noted as early as the age of 10 or 12. It is more frequent in cold climates than in warm, and relatively rare among the dark-skinned races. About 75 per cent. of all epitheliomata are located on the head (mainly the face), and half the remainder on the hands.

For practical purposes we may divide epitheliomata into three classes: (a) superficial or discoid, (b) deep or nodular (c) hypertrophic, papillomatous or fungating. A rare and unique form of epithelioma, not included in this grouping, deserves a few words. I refer to that form known as Paget's disease of the nipple, which begins as a dermatitis simulating an eczema of a scaling moist and crusted variety. The disease is most frequent on the

breasts, but cases have been observed on the scrotum, perineum, thighs, and abdomen. The affection may persist as a superficial process for many years, as many as twenty, but sooner or later the deeper structures become involved—in the case of the breast, the mammary gland—the neighboring lymph nodes become infiltrated, and the case runs the usual course of a visceral cancer. The diagnosis is based on the chronicity of the disease, its resistance to treatment, the deep red color of the denuded, granulating, and oozing surface, which is often covered in part with thick, adherent crusts, and the sharply marked, slightly raised circinate border of the lesion. Radical operation as soon as the diagnosis can be confirmed by the microscope offers the best chance of cure.

The superficial or discoid form of epithelioma begins as a minute, pale red, or fawn-colored, flat-topped or rounded papule, which slowly increases in area, and after attaining the diameter of a pea shows a slight depression in the middle, so that the border appears slightly raised and often has a shining, pearly appearance. In the course of time—it may be years—the surface epithelium of a part of the lesion is destroyed—a slight trauma is often the immediate cause of the surface injury—and a crust is formed. This crust persists, forms again when it is removed, and the little ulcer shows no tendency to heal. Gradually the lesion becomes larger, encroaching more and more on the neighboring tissues, and the ultimate result may be the most frightful destruction, involving the entire face, ending in extension to the lymph glands and general carcinosis, if life has not sooner been terminated through hemorrhage resulting from rupture of a large artery or vein.

Sometimes the entire lesion is markedly elevated, while the central ulceration extends deeply into the underlying tissues, producing a crateriform ulcer. Sometimes the epithelioma is for many years preceded by a small scaling area, on part of which a distinct crust may develop, and the lesion will then present the ordinary appearance of a flat epithelioma and run the usual course.

A modification of the discoid variety of epithelioma appears in the form called by English writers rodent ulcer. This form differs from the discoid mainly in limitation of the process to the upper portion of the skin, though extension to deeper tissues and involvement of glands is not wholly unknown. As a rule, however, rodent ulcer persists as a superficial local process for an indefinite period. Cicatrization of a part of the ulcer occasionally occurs, while the lesion spreads in new directions, the ulcer thus acquiring an irregular

serpiginous outline. The firm, scarcely raised border, the hard, irregular floor, showing no granulations, and the scanty secretion, are the main characteristics. Rodent ulcer occurs most frequently at or near the margins of the lower lids and on the sides of the nose and the cheeks.

In the deep or nodular form of epithelioma, the process begins as one or more nodules located distinctly under the epidermis. It may occur as a rounded or irregular elevation of the skin, or the level of the surface may be normal at first. With the growth of the tumor, the epidermis becomes involved, and presently breaks down into an ulcer, with the characteristic appearance of an epitheliomatous ulcer. The ulceration, however, is deeper, and the extent of the new growth around the ulcer is greater than in the discoid variety.

Hypertrophic, papillary, or fungating epithelioma is a clinical variant of the superficial form, in which an exuberant outward growth takes the place of the usual ulcer. This exuberant growth may soon break down and leave the ordinary appearance of an ulcerated epithelioma, or the hypertrophic tissue may persist as a cauliflower excrescence which becomes denuded of its epidermic covering and remains as a bright red surface covered with a viscid seropurulent secretion.

It would manifestly be impossible within the limits of this paper to attempt to describe all the variations in origin, appearance, and course of epithelioma. I wish particularly to emphasize the fact that the course of an epithelioma can never be predicted. A small superficial lesion may remain stationary for years, and never cause more than a slight disfigurement; or, on the other hand, it may suddenly begin to grow rapidly after years of quiescence. Other lesions of similar appearance may grow rapidly from the start. In the deep-seated epitheliomata, extension is usually rapid from the beginning, and glandular involvement often occurs early. Glandular involvement is more apt to occur early in the case of epitheliomata located on the lip and on the sides of the face immediately in front of the ear. Superficial epithelioma, rodent ulcer, and the exuberant forms are less likely to lead to metastases than the deep nodular form. Epitheliomata located in regions particularly well supplied with lymphatics are most apt to produce metastases, especially when the affected region is one normally subject to great alternations in pressure through muscular action; hence the great danger from growths on the lips and tongue.

The diagnosis of epithelioma is rarely attended with difficulty. Any persistent crusted or ulcerated lesion of the skin, however small or apparently in-

significant, should be regarded with suspicion. Any persistent patch of roughness or scaliness at the muco-cutaneous junctures should be looked upon as a possible beginning epithelioma. The hard, nodular, waxy or pearly border, the firm nodular base, the tendency to bleeding after a crust has formed, the history of a gradual development, of a previous scaling or horny lesion, or of the previous existence of a fleshy mole at the site of the lesion—these are sufficiently characteristic features when occurring in persons at or after middle life, to arouse at least a suspicion of malignancy, a suspicion which will readily be confirmed or allayed by the expert or by the microscope.

Two conditions with which epithelioma is most often confused are lupus and syphilis. Aside from the obvious clinical differences, it should be borne in mind that lupus invariably begins in childhood or adolescence, while epithelioma is a disease of advancing years. Epithelioma sometimes develops in an old patch of lupus, but this is extremely rare, and in such a case suspicion may be aroused by a marked change in the previous appearance of the lupus. An ulcerating tubercular syphilide will have none of the features characteristic of the margin and the floor of an ulcerating epithelioma. On the other hand, it must be remembered that the syphilitic is not immune to epithelioma, and a positive Wassermann reaction may serve to confirm an error in diagnosis. I have seen a syphilitic treated for a long time by salvarsan and mercury on account of an epithelioma of the lip. The patient's life might have been saved but for the loss of valuable time due to the mistake in diagnosis.

In considering the etiology of epithelioma, one factor stands out preeminently. There is no question of the rôle of trauma and chronic irritation in the causation of the disease. This influence is seen in the development of epithelioma on the basis of chronic skin disease like lupus, syphilitic ulcers, and even psoriasis. Epithelioma occurs on the tongue and cheeks where a rough or sharp tooth has for years kept up an irritation, or where a patch of leucoplakia has played a similar rôle; it occurs on the penis, where an adherent prepuce or a phimosis has been the irritating factor. Warts, moles, senile or arsenical or x-ray keratoses, with their likelihood to extraneous irritation are a frequent point of origin for epitheliomata. It occurs on the scrotum in chimney-sweeps and in workers in tar and paraffin. Since the passage of a law forbidding the chimney-sweep from climbing through chimneys, this form of epithelioma, once quite common in England, has become practically unknown. A striking evidence of the rôle of chronic irritation in the

production of epithelioma is afforded by the frequency of this disease on the thighs and abdomen of the natives of Kashmir. It is the custom in that country to carry small fire boxes (little stoves) suspended by a cord from the neck in such a way that the box rests on the thigh or abdomen. In the Kashmir Mission Hospital out of 1,189 cases of epithelioma, 848 (71 per cent.) occurred on the thighs or abdomen.

These examples are sufficient to show the rôle of irritation in the production of epithelioma, and they point to an important consideration in the prophylaxis and treatment of the disease. Every source of persistent irritation, especially in the aged, should be avoided or removed. The skin should be kept free from irritating foreign bodies by the frequent use of a bland soap. The services of a dentist must be invoked to avoid irritation from bad teeth. Repeated irritation of a mole, whether it be from the pressure of the eye-glasses, or of the corset, or from the razor, must be avoided, or if it cannot be avoided the mole should be removed. But it is not only these extraneous or accidental sources of irritation of a keratosis or a mole that must be guarded against. The fashion of removing "facial blemishes" in women by means which involve a direct risk of producing epithelioma is quite common. I have seen a number of cases of epithelioma develop after the treatment of moles by means of electrolysis, carbon dioxide snow, or chemical caustics. Any method of treatment of a mole which does not provide against the possibility of leaving a remnant of the embryonal epidermic inclusion in the cutis is to be condemned in the strongest terms. The atypical epithelial naevus-cells left in the scar tissue produced by the treatment are subjected to chronic irritation by pressure of the scar and are likely to undergo malignant proliferation. A mole should not be touched, or it should be removed radically. A mole which for any reason shows evidence of irritation or growth should be removed radically at once.

The same reasoning may be applied to the treatment of an already developed epithelioma. It is rather unfortunate that these lesions are always painless and for that reason are apt to be neglected by the patient. It is true that epitheliomata are often of extremely slow growth, but, as we have said, the course of an epithelioma can never be predicted. It should therefore be removed as soon as the diagnosis has been made. The need for prompt action is especially urgent in the case of epithelioma of the lips and tongue, and of the glans penis and the vulva; and the action should be radical. Hun-

dreds of cases of successful treatment of epithelioma in these regions by the x-ray or by radium have been reported; thousands of cases of unsuccessful treatment have not been reported. Tickling an epithelioma of the lip with the x-ray is a dangerous game. At best, the method is one for the expert.

In regard to epithelioma in other regions, the one thing to remember is that whatever the method of treatment employed it should be thorough. When the lesion is small and favorably located, a wide excision with the knife is the best treatment. Unfortunately, however, epitheliomata often occur in regions in which an excision is impossible without producing great deformity, as at the margins of the lids, the tip of the nose, etc. In these regions, the best results, both as to cure and cosmetic effect, are obtained by the use of one of the physical or chemical destructive agents. Epitheliomata in these regions are generally of the slow-growing and relatively harmless variety. The x-ray or radium properly employed, the quicker method of treatment with a chemical caustic preceded by thorough curettage, give excellent results. But whatever method of treatment is employed, thoroughness in the application is the keynote of success. The neoplasm must be eradicated at a single treatment. The chances of accomplishing this result will depend entirely on the size of the lesion, and it is in this regard that the heaviest responsibility rests on the physician who first sees the case. Every epithelioma at its inception is a microscopic object; it is a minute object when it first attracts attention. The physician who fails to recognize an epithelioma in its early stage, or who trifles with it after he has made a diagnosis or even suspected its true nature, is guilty of a serious dereliction or assumes a grave responsibility.

51 EAST SIXTIETH STREET.

HYSTERIA AND PELVIC DISEASE.

The connection of hysteria and pelvic disease, aside from the ancient theory of womb causation, is that of any neurosis and any disease. Hysteria may coincide with pelvic disease, it may modify pelvic disease, and it may be modified by pelvic disease. The numerous mutilations performed for the cure of hysteria have no justification. Repeated analyses have shown, in hundreds of cases, there was no favorable effect and any temporary benefit which might be secured was due to enforced rest. The old view of hysteria, however, still leads to the lucrative operation.—H. C. B. ALEXANDER in the *N. Y. Medical Journal*.

TRAUMATIC RUPTURE OF THE LIVER.*

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Rupture of the liver is fortunately not so very frequently met with, although relatively it stands next in frequency to rupture of the intestine. Of injuries to the solid abdominal viscera, liver, spleen, kidney, and pancreas, the liver heads the list. Its causes are many and may be both direct and indirect. Being caught between the bumpers of freight cars or run over by heavy wagons, blows upon the lower chest or upper abdomen or in the loin, falls from considerable heights, striking upon the buttocks, forced squeezing or acute flexion of the body, as in elevator accidents, or when great weight is suddenly thrown upon the body, are causes given by those describing this injury. Its location, situated as it is between the somewhat unyielding ribs in front, laterally, and behind, the rather tense, strong diaphragm above, and the rigid spinal column behind, together with its heavy weight, make the liver peculiarly susceptible to rupture when sufficient force is applied directly against it.

The location of the rupture is most frequently seen in the right lobe; those who have taken the pains to classify the location tell us that the proportion of right to left lobes is as six to one. The superior surface seems to be more often involved than the inferior, and, again referring to the statistics, we find the proportion to be two to one in favor of the superior surface. The extent of the wound in the liver is very variable, perhaps a small nick an inch in depth on the anterior margin, perhaps the liver has been completely torn apart, and all grades of injury between these two extremes are met with. Occasionally the torn surface involves the hepatic, the cystic or the common duct, as well as the liver substance. The injury may be a rather rough linear tear, it may be a very ragged linear tear, or it may be a very irregular wound of great variance in size. It not infrequently is complicated by wounds of other viscera, such as injury to intestine, stomach, kidney, diaphragm, or lung, which, of course, makes a primarily dangerous condition proportionately more serious.

Other forms of liver injury are chronicled, such as rupture of the substance of the organ, the injury not reaching the capsule, a hematoma of varying size resulting; or, again, separation of the capsule from the parenchyma with a resulting similar collection of blood beneath the capsule. For all practical purposes in this paper these may be regarded

as surgical curiosities, refinements of diagnosis likely to be attained by very few.

Rupture of the liver of whatever extent is immediately accompanied by profuse hemorrhage, the amount depending upon—first, the extent of torn surface exposed, and second, upon the number and size of the large vessels severed. The symptoms, therefore, can be divided into those due to hemorrhage and those due to injury to the liver.

Pain is at once complained of and is severe and is not infrequently accompanied by evidence of shock very early and this is particularly true, of course, if the rent in the liver be of large size. The pain is usually located in the upper right abdomen, perhaps in the right and left upper abdomen, occasionally it may be more general. Later, pain in the right shoulder is frequently complained of, and one of my cases complained bitterly of pain in the left shoulder. Anything which increases the intra-abdominal tension increases the pain. It is, therefore, made worse by deep breathing, coughing, vomiting, hiccough, or deep abdominal palpation. Breathing is apt to be thoracic in type, thus avoiding the downward movement of the diaphragm and the consequent pressure upon the damaged liver. After all, pain is very variable, depending somewhat upon the individual. Patients with rupture of the liver have walked several blocks, with not intolerable discomfort, have allowed several hours to elapse without thinking their injury sufficiently serious to seek medical aid. Tenderness on pressure over the upper abdomen is a fairly constant symptom and is perceptible at once, becoming more noticeable later. Rigidity of the abdominal wall is, as a rule, not marked, but is present within two or three hours. It does not, however, approximate in severity the muscular rigidity seen in inflammatory affections of the peritoneum. It is usually more marked upon the right side and may be entirely confined to that side.

Nausea or vomiting are not, as a rule, common symptoms and are not in any way characteristic of the injury. Hiccough is sometimes seen, but is in no sense pathognomonic; when seen it is more likely to be due to some complicating injury, particularly of rupture of the diaphragm.

Finsterer has observed marked bradycardia in six out of eleven liver injuries and believes it to be a symptom of value in differentiating the character of the abdominal injury sustained. This symptom, he believes, is present somewhat early and is transient, often disappearing before or soon after the patient enters the hospital. This observation has not been verified, however, by a sufficient

*Read at the 24th annual session of the New York and New England Association of Railway Surgeons.

number of others to make it of absolute diagnostic value.

The most marked symptom and the one which is by far of the greatest importance at the time of and immediately following the injury is the evidence of intra-abdominal hemorrhage. Pallor, increasingly rapid pulse, with lowered tension, thirst, and later restlessness, sighing respiration, and not infrequently delirium, is the evidence presented of this alarming condition. The symptoms of hemorrhage may appear at once or may be much delayed, not being definitely recognized for perhaps two or three or more hours, and even then increasing very slowly, or perhaps stopping altogether if by chance the damage done to the liver be sufficiently slight for clotting to occur and so bringing about a cessation of the hemorrhage.

This happy termination of so serious a state is, unfortunately, not often seen. The condition is usually a progressive one and steadily, with greater or less rapidity, grows worse until terminated by operative relief or death. Should hemorrhage cease, however, after continuing for a few hours, we are likely to see continued pain, due principally to the irritant effect upon the peritoneum of effused blood and bile. Some elevation of temperature is to be expected from absorption of fibrinogen of the intra-abdominal collection of blood. Bile escaping from the liver substance is usually sterile, and while it may cause a fibrino-plastic peritonitis, seldom produces the dangerous type of septic peritonitis. On the other hand, bile escaping from a previously infected bile duct or gall bladder torn at time of injury, will very quickly inaugurate a rapidly fatal peritonitis.

Usually after three to five days moderate jaundice will occur, due to absorption of bile by the peritoneum.

If hemorrhage has been sufficient there may be found some dullness on percussion in the right flank, due to accumulation of blood in the right kidney fossa.

The diagnosis of ruptured liver is oftentimes far from easy to make. Not infrequently the best diagnosis that can be made is that of a severe abdominal injury, causing marked intra-abdominal hemorrhage and demanding immediate laparotomy, and the true state of affairs is recognized only when the abdomen is opened. The history of the injury, the manner in which it was produced, should often be of substantial aid in assisting us to decide upon the pathological condition present. Signs of hemorrhage, pain in the upper right abdomen and not infrequently in right shoulder, thoracic respiration,

increased pain on deep breathing or coughing, and this increased pain fairly well localized in the region of the liver, the presence of these symptoms, together with the absence of nausea or vomiting, abdominal distention and bloody urine, should make us at least suspicious of liver rupture. We should at least be able to say that such a thought had not entirely escaped us.

And what are the results of this serious accident? Rupture of the liver has been completely recovered from, even when quite extensive, without any operative interference. Of that there is question. It is estimated that of those cases not operated upon, something like 85 per cent. die. Of those operated upon at some stage of their illness, the mortality appears to be from 40 per cent. to 45 per cent. As in other acute abdominal emergencies the best results almost invariably follow early operative interference. Shock is no contraindication to operation, as shock is due almost entirely to hemorrhage and will continue until the hemorrhage is controlled or until death ends the scene. Therefore, laparotomy is indicated at once unless the patient is practically dying. Nature does not deal as kindly in hemorrhage from the liver as in hemorrhage from the vessels of the extremities; there is no collapse of the vessel walls here to aid the formation of a clot, as the liver tissue prevents it; therefore, hemorrhage from severed liver tissue is extremely likely to continue unless it be mechanically stopped.

Eisendrath has stated in his most admirable paper on "Traumatic Rupture of Abdominal Viscera," that of 143 reported deaths from rupture of the liver, 59 died from hemorrhage. Our duty in these injuries is, therefore, plain. We must prevent this dangerous loss of blood at the earliest possible moment and to do this early laparotomy is demanded. If rupture of the liver is suspected, or if we are only moderately sure of some serious injury in the neighborhood of the liver, we may employ any one of the so-called liver incisions, selecting the one perhaps with which we are most familiar, making sure that our opening is sufficiently extensive for all our needs. Section of the abdomen is almost universally followed by a free discharge of blood, and this may be arterial and indicate that free bleeding is still going on. But the blood is nearly always venous and dark; in fact, bleeding from the liver is practically always venous. Without making any attempt to clean out this blood, the hand should be rapidly pushed over the superior surface of the right lobe of the liver as far as the suspensory ligament and to its extreme right margin—nothing being found, it should

then pass to the under surface, coming inward again to as near the longitudinal fissure as possible. The left lobe should be searched in the same systematic, thorough way. With this hurried but complete and thorough examination of the entire surface of the liver with exception of the posterior margin, it would be rare indeed if any rupture sufficiently large to produce bleeding of moment should be missed. The search should not stop with the discovery of a single rupture, but should continue; the whole liver being carefully gone over, as it not infrequently happens that two or more rents are found, although all may not be actively bleeding.

Once found, the tear may be packed with gauze and then attempts made at cleansing the abdominal cavity. Bleeding from a ruptured liver substance is ordinarily easily controlled by single packing, owing to the very low blood pressure in the hepatic veins, and when the wound is packed with moderate firmness, oozing of any amount seldom occurs. Should bleeding persist, however, and moderately firm packing found to be unavailing, or should it be necessary or desirable to clamp and ligate actively bleeding vessels, we should not forget the method of Pringle, of passing the forefinger through the foramen of Winslow and grasping the portal vessel between it and the thumb. This is said to produce most excellent temporary hemostasis, sufficiently complete to enable the operator to find and clamp a persistently bleeding vessel and perhaps to pack or possibly to suture the torn liver. If it is possible to do so I believe that all liver injuries should be sutured. Fairly close apposition of the torn surfaces should effectually stop bleeding, and this being accomplished, the abdomen can be washed out and closed without drainage. Closure of the torn liver substance may be carried out with a large, round needle carrying a No. 1 or No. 2 catgut suture, using an over-and-over stitch, being careful to take fairly deep bites on either side of the tear. Many injuries of the liver, however, will be found impossible of suture, due largely to their situation; most of those, for instance, situated upon the superior surface are so inaccessible as to make any attempt at closure by suture practically out of the question, and all efforts to accomplish such serve only to increase the size of the rent. This is also true of those injuries situated far posteriorly on the under surface. For these there remains nothing but moderately firm packing. It has been proposed to cut the suspensory ligament and the right lateral ligament and thus be able to rotate the liver, bringing into view more of its superior surface and making its inferior surface more accessi-

ble. To sever the suspensory ligament, however, is much easier said than done, and in the ordinary man would require scissors some eight or ten inches long, and to reach the right lateral ligament even longer instruments would be required, and few operating rooms possess scissors of this length.

It has also been proposed to make a large superior flap by cutting through the ninth, eighth and seventh ribs, and by so doing bringing into view a much larger portion of the liver and making it much more easy of approach. In doing this, however, there is danger of entering the pleural cavity, which serves to complicate rather than simplify matters.

Hemorrhage controlled either by suture or packing, the abdomen may or may not be washed out before closing. There seems to be no danger in closing the abdomen at once without any attempt at the so-called toilet of the peritoneum. The most that happens is a temperature varying from 100 to 101 or more for seven to ten days following, due to the absorption of old blood remaining in the abdominal cavity, and this sometimes creates a certain amount of anxiety for a time, fearing that it may be due to other and less friendly causes.

If packing has been the means adopted for controlling hemorrhage, there should be no haste in its removal. No harm results in allowing it to remain for five, six, or seven days; always provided that no signs of infection are in evidence. And, as we all know, packing in a newly made wound is removed with much less traumatism and discomfort at the end of six days than at the end of three days. Once removed, a light packing may be replaced to the bottom of the cavity and this changed every two or three days until the wound has entirely healed. As has been said, bile will usually be found upon the dressings within a few days, draining from the torn surface of the liver.

Other means of checking hemorrhage have been recommended and carried out, such, for instance, as circular suture of portions of the bleeding surface, through and through suture of the body of the liver, live steam, and the actual cautery, and some of these aids may be necessary at times. The actual cautery, while it may be useful in controlling primary hemorrhage, certainly increases very much the danger of secondary hemorrhage when the slough of the burn is cast off, and for this reason should not be employed, if other less objectionable methods will suffice.

Loewy, Maclaure, and Boljarski have separately used omental grafts, both experimentally and clinically, and seem to have obtained very satisfactory results. Sections from the omentum have been

sutured over the torn surfaces of the liver or been pushed into the rent and the edges of the tear closed over the flap with the result that complete closing of the wound has occurred much sooner than when allowed to granulate, sometimes even allowing the abdomen to be closed without drainage.

Better results can be obtained and will be obtained in the treatment of ruptured liver, but they will not be obtained until we recognize the possibility of such an accident at an earlier moment, and on such recognition take immediate steps to mechanically control the resulting hemorrhage with as little disturbance to the patient as possible.

CASE I.—H. S., 22, a brakeman, was caught in a railroad collision on October 3, 1902; when seen half an hour after the accident he complained of severe pain in the right upper abdomen and was unable to stand. Was transferred at once to hospital and given morphine for immediate relief of pain. Shock not marked at first, but came on rather slowly; complained of severe pain in the right upper abdomen, increased on deep breathing, and also of pain in right shoulder. Vomited two or three times within six hours after his accident. Pallor became very marked after three or four hours, apparently out of proportion to the amount of shock. Examination six hours after accident showed patient in marked shock with great pallor, rather tense abdominal muscles, particularly upon the right side; no dullness in flanks; no tympania, and presenting marked tenderness in region of gall-bladder. Laparotomy seven hours after receipt of injury, by Dr. C. L. Scudder of Boston. Abdomen full of dark, venous blood and blood clots. Further investigation revealed a large rent in the upper surface of the right lobe of the liver from which there was free bleeding. This wound was packed with gauze and abdominal wound closed up to upper angle from which packing protruded. Salt solution was given intravenously twice during the next few hours, but with no permanent benefit, death occurring eight hours after his operation.

In this case no hemorrhage occurred from the wound in the liver after it was packed, but the amount of blood lost previous to his operation was more than he could stand, and he died from acute anemia. He should have been operated upon as soon as he was admitted to the hospital.

CASE II.—H. B., schoolboy, 14, while coasting, was thrown from his sled against a telephone pole. He complained at once of severe pain in upper right abdomen and presented the appearance of one having a serious abdominal injury. He was admitted to the hospital about three or four hours after the receipt of his injury, where I saw him with the attending physician, Dr. C. F. Canedy, two hours after his admission. At that time his abdominal pain was less, but he complained severely of pain in his *left* shoulder. (He had had some morphine previous to starting upon his journey to the hospital.) He looked rather anemic and his

general appearance was not good. His pulse was 110, and this had increased from 90 since his admission and was of fair quality. Since his entrance to the hospital he had voided six ounces of clear, normal urine. There had been no bowel movement and no flatus had been passed. His abdominal wall was moderately rigid and was retracted. There had been no nausea or vomiting. There was slight tenderness over the liver. A diagnosis of probable rupture of the liver was made and immediate laparotomy was done. On opening the abdomen a large amount of free blood escaped; after some difficulty a large rent was found upon the anterior surface of the lower portion of the liver just to the left of the gall-bladder in the quadrate lobe. This was hurriedly packed as firmly as possible and the abdomen closed with the exception of the drainage opening, the patient leaving the table in rather poor condition. For two or three days his condition was exceedingly critical and it seemed impossible that he would live more than a few hours, but he then improved somewhat. Later, however, his pulse became more rapid and of less volume; he became confused mentally; somewhat jaundiced; frequently vomiting green, watery fluid, finally dying on the thirteenth day of his illness, apparently of cholemia. At no time had he any definite symptoms of peritonitis, his temperature seldom went above 100°, and he drained bile freely from his wound. His packing was removed on the third day and he had no hemorrhage at that time or later. In this case, if more time had been taken and the rent in the liver had been sutured and the abdomen had been closed without drainage, I believe the results would have been better. At the time, however, it was felt that the immediate need was to control the hemorrhage and to get out as quickly as possible, and packing seemed to best fulfill these indications.

TREATMENT OF GASTRIC ULCER HEMORRHAGE.

Medical treatment during acute hemorrhage should be the rule. The mortality is low in non-operative treatment, only three to five per cent., but extremely high if operation be performed. We should trust surgery less, and nature more, during this period.—ARTHUR HOLLINGWORTH, in *The Providence Medical Journal*.

ELEVATION OF THE PATIENT AFTER LAPAROTOMY.

In the last few years I have been in the habit of at once elevating the head of the bed in practically all abdominal cases. As soon as consciousness is complete, or within twelve or twenty-four hours, patients are placed high and comfortably with pillows on the back rest. This without doubt materially lessens the nausea and flatulency, and in all peritoneal and pelvic infections improves drainage.—RAYMOND WALLACE in the *Southern Medical Journal*.

THE RELATION OF THE RAILWAY SURGEON TO THE PATIENT.*

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The subject of my remarks is one which has interested me very much during the past few years. To do full justice to the company that employs you, and to the sick and injured, requires careful, judicial, and executive ability. The railroad surgeon's attitude to the injured, on the one hand, and the railroad company, on the other, is one of serious responsibility. The code of ethics of the medical profession holds that no matter in what position we are placed, or how unpleasant the situation, our duty is first, last, and all the time to the physical welfare of our patient. When a surgeon comes to have any considerable experience with these railroad accident cases, his faith in human nature is apt to be somewhat shaken and the beautiful teachings of the medical ethics are at times greatly weakened. With the majority of injured—not all, I am happy to say—the slogan seems to be, "The railroad company is rich; get all you can." And it is the prevention of this unfair attitude toward the railroad company, on the one hand, and the duty of being entirely just and fair to the injured, that makes the position of the railroad surgeon very trying. With full justice to all concerned, I have made it a rule to favor the injured as much as possible, on the theory that it is much better to have the patient satisfied, believing that when he goes to the company surgeon he will receive fair treatment and so will be guided to a more or less extent by what the surgeon tells him with regard to the duration and the extent of his disability, etc., rather than have him run off at the first opportunity to some non-company surgeon and perhaps receive a woe-fully exaggerated diagnosis of the case, with all its attendant results. At the same time, by inspiring confidence in the public in that way, they are all the more willing to come to the company surgeon at once.

Of course, this will be all changed under the new Workmen's Compensation Law, through which the injured person is practically compelled to employ the company surgeon, but the principle remains the same. The fewer the number of people engaged in handling the case the better. Previous to the enforcement of the Compensation Law, I always advised the injured to settle direct with the railroad company, rather than place their cases in the hands of an "ambulance chaser."

Another point which is occasionally a possible source of embarrassment to the company surgeon is the treatment and advice to be given an injured person who is or has been a patient of his. Here the situation is somewhat different from seeing the patient for the first time; for he more naturally looks to us for advice both as to the time of disability and the amount of damages. Here we have to be guarded in what we say, and the less we say the better.

In taking care of friends who have been injured, the company surgeon is also at a disadvantage; for here, in spite of all that he may do, his friendship is apt to sway him somewhat to the detriment of the interests of the company and at the same time result in no benefit to his friend. In such cases it is better, if possible, to turn the case over to some other company surgeon. From my experience with such cases, I find that the only course for the company surgeon to pursue is a rigid adherence to facts.

Another source of anxiety is in regard to the treatment and care of cases in the hospital. In some respects this is of more importance to the railroad company than it is to the surgeon. How long may the patient remain in the hospital without detriment to the company, and how soon may the patient be discharged from the hospital without prejudice to him? are two of a host of questions which the company surgeon must answer along these lines.

Often we encounter a patient who objects very strenuously to entering a hospital, but who after a couple of weeks' stay there objects even more strenuously to leaving the institution. Then again, there are cases which the surgeon knows are practically healed and have no reason for remaining longer, but who manage to develop pain and disability whenever the attending surgeon appears in the ward. Here is another problem for the company surgeon to solve. I have made it a point in this class of cases to rule more in favor of the patients and allow them to remain in the hospital perhaps a week longer than is absolutely necessary, in order to assure them that everything proper has been done. Unfortunately, I find that many of these cases are only too eager to find fault, not only because of their being discharged, but with their treatment in general. This tendency to try to remain in the hospital longer than necessary, to make their injuries appear more severe than they actually are, and to find fault with everything, I am sorry to say, I find more prevalent among the higher grades of employees than among the laborers and lower classes of workmen.

*Read at the 24th annual session of the New York and New England Association of Railway Surgeons.

We are frequently called upon to examine people injured on the railroad and treated by other surgeons, with reference to the severity of the injury and the amount of disability present and as to whether or not it is permanent. Very often we do not see these cases until some weeks or months after the alleged injury, and this makes our task, except in the most obvious cases, very difficult. As you all know, these cases are sometimes coached by their lawyers, and it is almost impossible to detect when they are malingering. Sooner or later, however, in the course of the examination they are almost sure to let something slip which puts the examining surgeon on the right track.

In the worthy cases (which are in the majority) I take it that the railroad company is always willing to go more than half way in the matter of settlement; but in the fake cases they are more likely to go just as far the other way in fighting them.

In making out reports with regard to the extent of the injury, the question has come up to me as to whether we should render any opinion in regard to the future condition of the patient, the point being made that later, if compelled to go upon the stand, this report may be put in evidence, with resulting embarrassment to us. But it always seems to me that the company, as well as the patient, should know the exact status of affairs and govern themselves accordingly.

I believe the majority of surgeons dislike to give testimony on the stand, owing to the amount of time it consumes, etc. When called upon to testify, I believe they should do so honestly and plainly, favoring neither one side nor the other, but giving the facts just as they present.

Another question that we are called upon to answer is to estimate the period of disability. This is often very difficult to do, as sometimes the cases which seem most trivial turn out to be the most severe; what seems to be very severe cases prove to be very mild. I always proceed on the theory to make the time of disability rather short, extending it later if the case proves serious, rather than making a long estimate of the disability in the beginning. It is always easier to explain why the disability proved more serious than we anticipated and so lengthen the time rather than shorten it.

A great annoyance to the surgeon is the relatives and sympathizing friends of the injured. They call one up on the telephone any hour of the day or night and ask all sorts of absurd questions. Of course, we have to answer these questions calmly and pacify them as much as possible. I find that the less specific we are, and the more we deal in generalities, the better, the less we shall be con-

fronted with later when possibly on the stand the plaintiff's lawyer will say: "But didn't you tell his wife that such and such was the case?" Such questions, while not exactly embarrassing, are best to be avoided if possible. "Speech is silver, silence is golden."

The question of filling out insurance papers and giving certificates of disability also comes up. I never fill out one of them without first referring it to the claim agent for his sanction and also that he may be cognizant of the things going on in the case.

Briefly, then, I have tried to point out some of the difficulties under which a company surgeon labors. I think I have shown that his position is certainly one requiring careful judgment. It is possible that the new Workmen's Compensation Law may solve some of these problems.

MAJOR POINTS IN MINOR SURGERY.*

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Fellow members of the society and visiting friends:

The title of this paper, "Major Points in Minor Surgery," was prompted by the fact that during a fifth of a century doing railroad surgery, the mistakes I have made and the mistakes I have seen others make have impressed upon me one thing—no matter how great may be his name all surgeons make the major portion of their mistakes in the field of minor surgery. From the setting of fractured bones to the most simple of minor operations our pathway is strewn with our mistakes that the other fellow sees, and the other fellows mistakes that we see. It would be unreasonable to expect that we could or would see very many of our own mistakes, because the mirror we use seldom shows us anything but the conceit and self-importance that is projected into it.

I believe most of our mistakes are errors in judgment, not errors in mathematics. Not all problems in minor surgery are as simple as $2 + 2 = 4$. Seldom a doctor makes a good judge or a first-class business man; the get-rich-quick companies can tell you who are the easiest marks if you don't already know from personal experience. We too often jump at conclusions, we fail to properly weigh evidence, we take too much for granted, as the notes on the following case will illustrate:

A railroad brakeman called at my home at 6:30 A.M. to dress a sore hand. On taking off the bandage I found that the wound had been previously dressed. Twenty-four hours before, while coupling

*Read at the 24th annual session of the New York and New England Association of Railway Surgeons.

engine to baggage car, his right hand was caught between the two draw-bars, the fleshy part of the thumb was bruised and split open, making a clean cut about three inches long. It was about two hours before he could get to a doctor to have it dressed. The doctor washed out the wound and sewed it up tight, making no allowance for future swelling, and sent the patient home. During the following night the pain in the whole hand grew steadily worse. I found a hand badly swollen and three of the six stitches pulled out. I took the remaining stitches out, applied a hot antiseptic compress and sent him on his way rejoicing.

Now, the fact that this case came from the office of one of the best surgeons in Massachusetts, and that a surgeon of large experience and capacity should fall flat on the proper treatment of so simple and common a thing as a lacerated wound caused by external violence will persuade any fair-minded man that errors in judgment in minor surgery are possible. We all know how to sew up a cut, but we too often fail to take into account what made the cut—too often all the causative facts in relation to the accident are not properly weighed before we begin our treatment.

Our conclusions after observing a series of such cases is that deep incised or lacerated wounds are too often sewn up tightly with no thought of how much damage has been done the deep layers of muscle or how much infection may have been carried to it.

Be sure the bottom of the wound is clean before you seal the top. If there has been much crushing of the deep tissues be on the safe side and put in a small drain.

The hands and feet of railroad men are of great importance. It is here that conservative surgery shines at its best. Not all cases are as bad as they look. The most conservative surgeon amputates too much. The idea that you must cut off all bone that can't be readily covered with skin is too common a notion altogether.

The great toe, forefinger, or thumb should be saved; even the smallest fraction of an inch may be of positive value. If it is necessary to use the flesh the nail rests upon or the matrix for any part of the flap, scrape the matrix till you are sure all nail-forming tissue has been destroyed.

Nothing is more of a nuisance to a workman than a deformed nail on some all-important finger. In all cases of injury to toes or fingers, we cut off only such soft tissue as we are sure has lost its blood supply. I use a pure peroxide dressing changed every twelve hours for the first two days, or a sulpho-naphthol dressing changed as often as necessary to keep it clean. Some like dry dressings for lacerated wounds, but my experience has been

that a very small percentage of wounds do well treated dry if there is much skin missing. Don't be in a hurry to cut off bone not covered by flesh; let it alone and see what nature will do.

G. B. lost the last joint of his great toe while trying to replace a derailed car. The skin was off from as far back as the great toe joint and very little flesh covered the remaining portion of the toe, the last quarter of an inch having no flesh whatever upon it. What to do was the question. Amputation was the quickest way out, but to get a flap it would be necessary to cut the metatarsal bone two inches back of the metatarso-phalangeal joint, which is not a practical proposition for any man who is called upon while at his work to climb a ladder. Unjointing the tarso-metatarsal joint was the only thing left to do. This would put the man back to work in four weeks with the best part of his foot missing. I understand shoes are made for just such cases. I know of trainmen who are wearing such shoes, but I have never seen one who was as sure on his feet as before the accident. It is just that point I wish to impress. We need sure-footed men. Man at his best is none too sure-footed and anything we can do to save any part of the foot is time and money well spent. Mr. B. was back at work in three months with all his foot but the last joint of the great toe.

I wish to call attention to the fact that excessive granulations, known by the laity as "proud flesh," may be mistaken for healthy granulations; the few notes I have on a case may be interesting:

A laborer came to my office with a sore thumb. He said the doctor who had been dressing it was out of town. He claimed it had been dressed every day for the first week or so and then every other day. He presented a large granulating surface from the end of the thumb to the first joint on the inside edge. The length of time he claimed it had been healing aroused my suspicions and with a pair of forceps I gently poked around at one little spot I could get under, the edge was freed, I lifted a thimbleful of granulation tissue out of its bed. This large mass came from one small pedicle the size of a pin. The strange thing about it was that the whole surface under the granulation tissue had healed with the exception of the place the pedicle came through. I cut the pedicle, applied a caustic, and that is all there was to it.

This case came from the office of a first-class man of large experience and can be explained only on the ground of carelessness. The matter of a sore thumb did not appeal to him as a thing of major importance. The fact that the man was deprived of his ability to earn his living, and his family was obliged to suffer, or the party for whom he worked was obliged to do without his services, did not make the slightest impression. It is a question if that phase of the situation was ever given a thought. We see enough of the innocent suffering

for the guilty in real life without increasing the total by our own carelessness.

My point is just this: We all make too many *plain fool mistakes*. It is good for us once in a while to confess our sins and in this way get inspiration for more careful work in the future.

SURGICAL CONSCIENCE. THE DUTY OF ASEPTIC TECHNIC.

A. F. JONAS.

OMAHA, NEBRASKA.

Conscience manifests itself in the feeling of obligation and duty, in the moral judgment of the individual, as applied to his daily work, and in the application of principles and methods that regulate his daily conduct and enable him to distinguish between right and wrong. It creates a feeling of duty or obligation—a moral sense; scrupulosity, conformity to one's own sense of right in conduct and practice. A good conscience must be based on justice, honesty, truth and correct reasoning. No one can reason correctly unless his conduct is based on a correct knowledge of underlying principles. And these principles in science must be based on painstaking observation and a correct interpretation of Nature's findings. Natural laws are fixed and irrevocable. The slightest transgression of any of them means error. To be conscientious assumes the existence of a high character. "Character is higher than intellect" (Emerson). It means a careful and scrupulous application of all known aids to the performance of the task in hand. A surgeon, without a conscience, is an anomaly. A surgeon without a character is a freak. The technic of surgical procedure is made up of endless details; the neglect of any of them is followed by defective repair. The punishment is sure and certain. The watchful eye of the police officer is not essential. The surgeon's conscience and it alone must be the guardian of the law. Surgical conscience means that the scientific habit must be acquired. There must be a scientific attitude of mind with a rigid adherence to truth which supplies a fundamental condition of character. Professional scientists and a scientific atmosphere are conducive to the character of the well-equipped surgeon.

It is, therefore, necessary for the training of the medical student to surround him with instructors of the highest scientific skill, men who are investigators, who follow the truth wherever it may lead them, men who are ever ready to discard the old, when new data have demonstrated new truths. This means that opportunities for actual work must

be provided. Laboratory facilities must be ample. There must be supplied an equipment in the form of well-selected instruments and apparatus as well as literature. The student must learn to use his hands as well as his brains, that he may learn to think and manipulate. The manual dexterity that he acquires in the laboratory should stand him in good stead when he enters on the practical duties of his professional work. He soon learns that errors in the laboratory mean failure. He learns precision and he becomes exact and if he persists so that exactness becomes a habit, he will find little difficulty to apply the same methods to his surgical work.

Great stress has been laid upon the importance of supplying large and well equipped laboratories for our medical schools. These are certainly of great importance, but they should not occupy the first place. The first requisite for a medical plant are the instructors. The school should be well manned. Men are more important than palatial buildings and costly equipment. The young man, schooled in such an atmosphere, learns only the truth as revealed by modern research. Further, he has been taught the methods by which he may follow the truth and the means of solving problems that are not yet fully revealed.

From the practical side of the surgeon the laboratory must develop in him a conscientiousness that becomes a habit of his daily life. Constant repetition gradually becomes a subconscious act, so that each step of the procedure follows the other in as perfect and harmonious succession as do the notes of an instrument played by a master. Every break in the surgeon's technic must warn him as if he had burned his fingers on a hot iron. When he has entered on the practice of surgery, he must have learned that his methods must be adapted to the pathology before him. If he is only a routinist, his success will be indifferent. But if he has in mind, first of all, the welfare of his patient, he will succeed. If he learns when to operate and when not to and adheres to his convictions, his reward is certain. His guiding thought should always be a desire to relieve and cure. He must not be satisfied with the methods of the present, but he must strive to improve and to advance. He must be familiar with the achievements of the past and know the reason for the successes and errors of his predecessors.

The surgeon's duty is to do complete work when conditions will allow. After a thorough investigation as to the nature and extent of the lesion, he should neglect no part of an operation. He should not be satisfied with the removal of a diseased ap-

pendix and overlook a megalocæcum or pathologic pericolic membranes nor ignore a misplaced uterus or diseased uterine adnexa. He should not be satisfied with the easier operation of draining the gall-bladder when its condition demands its removal. He must not rest content with a simple gastro-enterostomy when a pylorotomy will add to the permanency of the result. He should not operate against time. His chief aim should not be an effort to count up a large number of cases. For no one man can do ten or twelve cases daily during the space of a forenoon and do them all well.

Having familiarized himself with his case, the duty of technic is thoroughness and gentleness. He should dissect and cut rather than tear and bruise the tissues. It has occurred to me that at least a part of the success in anoci-association is Crile's wonderful technic. His knives are unusually sharp, he has wonderful skill as a dissector. His hemostasis is accurate. All of his maneuvers are of the gentlest. There is no bruising of the tissues. He works rapidly. All of these maneuvers reduce the chances for shock, because the traumatism created by the operation is reduced to a minimum.

We may say that our technical duty consists in gentleness of manipulation, and complete operations done under a faultless asepsis, based on an accurate regard for anatomy and living pathology.

It was Richard Volkmann who first insisted that the operation itself and the first dressing determined the fate of the wound. All subsequent experience has demonstrated the correctness of this view. A wound which had been treated in an anti-bacterial sense, aseptically, remained sterile. It was with such a comprehension that the transition from antiseptics to asepsis took place.

In times gone by we were wont to attribute wound disturbances to supposedly imperfect sterilization of catgut, especially if the gut had been prepared by a manufacturer. With an increasing experience we were, perforce, compelled to realize that the ligature had often been unjustly accused and that the real fault lay in the imperfect preparation of our hands. When we think for a moment, we note what we ought to have seen long ago, that dirt and infection are more likely to adhere to our grasping apparatus than to any other part. Our hands must handle, not only operating materials but often touch unprepared parts of the patient and other objects that are not free from pathogenic organisms. The peculiar construction of our hands, especially our fingers, renders sterilization difficult, particularly the nails. We all know how difficult it often is to remove the final rests of dirt and

infection from under the nails. Too little importance is attached to individual difference in the nail construction and the different conditions of the nails at different times in the same individual. At times the nail cleansing is a very simple one, and at others, it is most difficult and almost impossible, owing to the ragged condition of the skin under and around the nail beds. The act of soaping and brushing and scraping the open and smooth nail is comparatively easy. If the nail bends forward and closely hugs the finger's end the more difficult is the soaping and cleansing.

The method which we use for the sterilization of instruments, unfortunately, can not be used for our hands. It is possible, however, by a process of adaptation, to employ a gradually increasing temperature of the water used for our hands, but it has its limitations. The heat and the soap soften the superficial epidermal layer with much certainty. The surgeon who can adapt his hands to high temperatures during the sterilization process has many advantages and more surely attains the desired end. Experience has shown that mechanical disinfection—by nail scraper, soap and brush, and the hottest bearable water—is by far the best method. Chemical disinfection, as usually employed, is absolutely without effect. The momentary dipping of the hands in a chemical solution has positively no germicidal effect. How often do we see an operator take hold of a chair or table, or brush his hair or moustache, or readjust his glasses, and then proceed with his operation after dipping his hands in sublimate solution for the long space of five seconds? He fears to keep them there longer than five seconds because he might really disturb the happiness and comfort of the adherent germs. Then, when his wound suppurates, it must have been the hickless catgut!

In spite of the many experiments and the many more articles written on the subject of hand sterilization, we cannot rid ourselves of the conviction that it is impossible to render the hands sterile as we do instruments and dressings. A perfect method of hand sterilization does not exist. The most conscientious surgeon cannot give the guarantee that his hands, in any given case, are entirely free from pathogenic germs. The danger of infecting with doubtful fingers increases with the duration of the operation and the intensity with which the fingers are used, especially in a cavity where adhesions are separated and the tissues have become more or less bruised. Under such circumstances we must ask ourselves if it is not advisable to *refrain from a direct contact between the wound and our fingers*. Instantly we hear the reply that it is impossible

to do any operation without more or less continuous contact of the fingers with the wound surface. But let us pause for a moment and consider an ordinary inguinal herniotomy. The skin incision is made with one or two strokes. Another incision and the subcutaneous fat is divided down to the cremasteric fascia and the external oblique, three or four bleeding points are clamped; the wound margins are separated with sharp retractors or by placing the left thumb and index finger on either side of the incision and a half inch away from its margins, separating them so that the external ring can be seen. Should any loose areolar or other tissue overlie the margins of the ring, it can be pushed aside with a Kocher director or a swab. The canal is laid open with a pair of scissors or with a knife following a groove in a director. The left thumb and finger now release the skin margins for they will now remain sufficiently separated to admit of all manipulations. No part of the wound has thus far been touched with the fingers. Now a clamp is fixed to each margin of the divided fascia, the contents of the inguinal canal are picked up with a mouse-toothed forceps, the cremasteric fascia and the underlying connective tissue is released and divided with a scissors aided by a thumb forceps. The outline of the hernial sac can now be plainly seen and it should be grasped with an artery clamp and held with the left hand. Take a swab in the right hand, grasp the cord with the gauze and gradually separate the sac from the cord to the internal ring. Then transfix the sac, passing the needle with a holder. Cut away the sac and drop the stump. Now drop the cord into its bed and close the canal with chromicised catgut or tendon according to your special method. Always grasping the tissues through which the needle passes with a pair of dissecting forceps. And, lastly, unite the skin margins as you choose. All this has been done without bringing the fingers in contact with any part of the fresh wound, every part having been handled with sterile instruments and swabs. It is at once clear that the chances for infection have been reduced to a minimum. Barring the possible errors in the preparation of the ligature material, all chances for infection have been eliminated. This is known as the "messer and gabel" method of Koenig.

With an increasing experience I have added one operation after another to my *repertoire* where the direct contact of the fingers with the wound surface was avoided. I found that 75 per cent. of the herniae can be managed in this way, nearly all scrotal operations and all of the cases of round ligament shortening according to Alexander. Interval appendicectomies, where adhesions are limited

or entirely absent, can be performed without finger contact. Breast amputations are done in like manner. Many intestinal resections and stomach operations are done by this method. The most extensive extirpation of cervical adenomata and many goiters can be completed without digital contact. Nearly all neoplasms on the exterior of the body, the skull and extremities can be removed in the same way. Nearly all amputations and joint resections should be and have been done in the same manner.

In short, nearly all the capital operations can be thus managed. Thereby the operator will save himself the painful apprehension of infection.

To carry out operations in accordance with this idea requires a certain technic which can become exact only after an infinite amount of self-training and constant, unremitting, self-watchfulness. The idea must become so thoroughly rooted in one's mind that to touch a raw wound surface should fill one with horror. When the operator has succeeded in fixing this idea within himself, he must imbue his assistants with the same principle. This is often not difficult, because the assistant usually has everything to learn and nothing to unlearn. The older surgeon who has learned to cut and poke his finger into the wound at every step, may find it difficult to unlearn a bad habit, perhaps can see no harm in the procedure and will continue to cut and poke and infect to the end of his time. The younger man, who has been reared under the influence of the science of bacteriology, has no difficulty in understanding the doctrine of "touch not."

It is self-evident that our instrumentarium must be specially selected. The instruments, as a whole, should have longer handles, so that the hands are not brought too near the wound. A larger number of retractors should be used and they should be of greater variety as regards width and length of hook so as to suit superficial and deep wounds. The hemostats should all have longer handles and they should have a variety of jaws. The ligation of ligatures can easily be done with two pairs of clamps. Suture and transfixation ligatures can all be introduced with a curved needle. To lift structures, and especially neoplasms, from deep cavities we require a variety of volsellum and other grasping forceps.

Should it be necessary to retract wound margins with the fingers, the structures should be covered with gauze, but finger retraction is very seldom necessary. All sutures must be introduced with a holder. The use of drains in clean wounds should find very little place. If we have completed an operation without finger contact and the wound itself contains no infection, we will be certain of

the result. We can feel assured that a rise in temperature is not an indication of infection which calls for a change of dressings. In several of my cases that had been operated upon by the "touch not" method, the temperature rose to 103° F., but I was so confident that I had to deal with an absorption fever that I felt safe in not opening the dressing.

We have all stood by and observed the surgeon who felt his way along. He felt of the tissues so frequently that you could not repress the thought that he did not know his anatomy. The man who is not familiar with the appearance of normal tissue, certainly should not attempt an operation. He must thoroughly familiarize himself with normal living tissues by observing and assisting surgeons of large experience at work for a considerable period. The surgeon who must always feel his way into the abdomen is not properly prepared for such important work. He seems to be unable to differentiate between physiological and pathological structures. While we cannot entirely do away with digital exploration, experience has taught that about 60 per cent. of the cases can be done without direct finger contact. Operations, so far as possible, should be done through liberal incisions, so that the entire field is brought within the range of vision and then it is possible that a neat anatomical dissection can be made. Important structures are less likely to be damaged. If a muscle or tendon requires division to facilitate better access to the lesion, it can be smoothly done and can be accurately readjusted and united by exact suture. Hemostasis is not difficult. Blood vessels can often be seen and cared for before they are divided. Given free access to the wound, the entire operation, in most instances, can be done with instruments. The fingers need touch no part of the operation field.

I have succeeded by this method in nearly 60 per cent. of my cases. In the 40 per cent. where I have not succeeded entirely without handling the tissues with the fingers, I must ascribe the failure partly to a still defective technic and partly to the nature of the pathology, as, for example, the separation of extensive pelvic adhesions. Even here, it is possible to manage many adhesions by wrapping around the ends of the fingers several layers of sterile gauze, which not only prevents infection but very materially assists in separating the adhesions. To prevent finger contact absolutely, we have a means in rubber gloves, which may be worn at all operations. Gloves are easily sterilized by boiling or by steam prior to the operation, by scrubbing with soap and water should they become infected during the course of the operation. The

ease with which a new smooth rubber glove can be sterilized, should there be accidental contamination during the progress of an operation was shown by O. Wandel and O. Hoehne, assistants in Kiel. They found after a series of experiments that rubber gloves could be smeared with cultures of staphylococcus pyogenes albus, streptococcus pyogenes prodigiosus, or with staphylo or streptococcus pus, or with intestinal excrements, and, after being allowed to dry for twenty-four hours, could in many instances be made absolutely sterile by a vigorous scrubbing with green soap and water for a period of two and one-half minutes, certainly a great advantage over any hand sterilization with which we are now acquainted.

Gloves are not only important for the performance of aseptic operations, but they are indispensable, when dealing with suppurating conditions for protecting the operator's hands. Infection is still too often carried from one case to another, simply because the operator insists in exploring a suppurating cavity with his unprotected finger. No suppurating surface should be touched with the bare fingers. A certain and safe hand sterilization method to insure asepticity after fouling the hands with pus is not known. In all cases where suppurating or infected cavities are examined by digital exploration, the finger should be protected by a new finger-cot, or the hand should be encased in a new rubber glove. Direct digital contact must be avoided. We must, however, reject a glove that is perforated and never use one from which the gloss has disappeared. The use of a perforated glove may become a source of infection, particularly when the hand has been introduced into a wet glove, which will macerate the epidermal layers and at the same time liberates the skin bacilli. The dry sterilized gloves and dry fingers powdered with talcum will, to a great extent, prevent infection if the glove is accidentally perforated.

So we note that in septic as well as aseptic conditions, the bare fingers should not come in contact with the wound surfaces. In any event, whether the wound is aseptic or otherwise, it is in accord with the teachings of modern surgery, which is based on bacteriology, that all wounds will fare best when subjected to the least possible digital contact.

The necessity for faultless aseptic technic is best illustrated in our fracture work. All are agreed that to achieve ideal results it is essential that the work be done under ideal conditions, which means a perfect control of asepsis and unusual mechanical and operative skill. Any lapse in aseptic detail is more fatal to perfect bone union and perfect final

results than any similar error in the technic in abdominal surgery for the lymphatics are less able to cope with infections than in the peritoneal cavity. I need only mention the elaborate and exact aseptic details as practiced by Lane in his fracture operations.

I have said enough to show what is meant by a surgical conscience. We must first know Nature's laws and the penalties for any transgressions. We cannot escape any violations.

A REPORT OF PRACTICAL EXPERIENCE WITH NARCO-ANESTHESIA.

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To Professor W. Wayne Babcock I am indebted for calling my attention to the advantages of "narco-anesthesia." As a more general application of this method of inducing anesthesia has been utilized by me, and the advantages over ether, for similar conditions, are so unquestionably superior that a brief résumé of experience seems worth presenting.

The operations on the brain by Dr. Babcock which I had the privilege of witnessing convinced me that the usual apprehension and distress that accompanies ether anesthesia preparatory for operation is entirely eliminated by narco-anesthesia. Another decided advantage is the conspicuous absence of respiratory disturbance incident to the hypersecretion of mucus, which, in addition to the struggles of being etherized, invariably results in great distention of the veins, and therefore interferes—as all operators well know—with facility of procedure.

Narco-anesthesia also eliminates gastric disturbance, and the circulatory turgescence accompanying emesis. The long rest after completion of operation—varying with the individual and the degree of narco-anesthesia induced, from three to seven hours—finds the patient emerging from unconsciousness without the nauseating effects and the stench of ether, and without that profound relaxation which is the consequence not only of the direct action of the latter upon the brain and nerve-tissues themselves, but also of its disintegrating effect and functional disturbance of the erythrocytes, which contribute so largely to surgical shock. So pronounced is this, that the conclusion is inevitable that shock is, more largely than hitherto has been recognized, the result of apprehension and fear, suppressed at great nervous expense in approaching the operating table; and, doubtless, as Crile has intimated, the unconscious-

ness of ether does not involve the unconsciousness of the cerebrum to the shock-producing effects of pain. Whether one or two of these etiologic factors adequately describe the freedom from shock, certain it is, that the very desirable state of post-operative tone exists after narco-anesthesia.

With abdominal operations involving much manipulation there has thus far been total absence of post-operative ileus. In this feature ether anesthesia and narco-anesthesia present such a striking contrast.

The method of procedure which was gradually evolved, and which for more than a year I have pursued, consists in the hypodermatic injections of one-fiftieth of a grain of scopolamine hydrobromide, with one-sixth of a grain of morphine. An hour and a half before the operation is scheduled, the first injection of this formula is given, half an hour later the second, and twenty minutes after the second, a third, with or without the morphine, as the condition of the patient indicates. Recently, twenty minute intervals have been satisfactorily practiced.

At the time of the third injection an enema is given of two fluid ounces each of spiritus etheris compositus and spiritus frumenti, and four ounces of water. As a rule, there is sufficient narco-anesthesia induced by this to render practicable the performance of any operation. Occasionally, the sensorium is only slowly rendered profoundly somnolent. This is manifested by the patient opening the eyes when attempt is made to transfer him to the operating table. More rarely, apparent wakefulness is manifested by the patient raising the head and appearing to look about. In the two or three instances where this latter condition obtained, later inquiry developed the fact that consciousness was totally lost—at all events no recollection whatever was had of the apparently partially roused state. When this occurs, the hypodermatic injection of apomorphine hydrochloride exercises a synergistic effect, and renders total the desired narco-anesthesia within from three to five minutes. In only one instance did slight vomiting follow the apomorphine.

From the viewpoint of the physiologic effects of morphine, this combination fails to produce the physiologic effects which an equal dose of morphine alone would show. The pupil is not contracted, and the respirations are not lessened in number nor modified as to depth; the heart action remains practically normal. Flushing of the face, which would be occasioned by an equal dose of the scopolamine hydrobromide without the morphine, is present only to a mild degree. Occasion-

ally, the characteristic redness of the face is moderately pronounced.

Practically, once in twenty-five cases it is necessary to give a fourth, and still more exceptionally a fifth, injection of the scopolamine-morphine combination. In the five or six cases where this has been done, there was very slight physiologic respiratory alteration. In a word, there was wanting the toxic manifestations of either morphine or scopolamine if administered in equal doses and alone.

In some few cases of cardiac and renal disease, and in arteriosclerosis, where the administration of ether would have been attempted, if at all, with trepidation, narco-anesthesia was induced without any untoward effects. A surprising result of this combination is that it does not lessen renal function, unless five injections are necessary, and then but slightly, for a few hours. The patient presents the appearance of one in a natural sleep, and if apomorphine hydrochloride has not been used, there is a slight flush. When this remedy has been employed for its synergistic action, pallor may or may not exist; as a rule it does, for several minutes, and then gives place to a natural color.

At the patient's head should be an attendant, whose duty it is to see that there is not a falling back of the tongue, resulting in asphyxia. (It may be remarked, at this juncture, that there is every reason to believe that some, at least, of the fatal cases reported as the result of scopolamine anesthesia—*not* narco-anesthesia—were really instances of asphyxia.) This precaution is especially necessary, as profound narco-anesthesia may abolish all reflexes, and there may be no symptoms of obstruction of the respiratory tract other than convulsive movements of the thorax, which inexperienced attendants might look upon as modifications of respiratory movement. It is a good plan to introduce a compress between the teeth, and to have convenient a napkin, with which, by grasping the tongue between the thumb and fingers, it can be gently drawn forward, and the danger of asphyxia absolutely avoided. The use of the tongue-forceps is to be condemned, especially as it is not necessary.

Under narco-anesthesia I have performed radical operations for mammary carcinoma. These patients recovered consciousness in from three to seven hours, with entire freedom from the disagreeable after-effects which some of them had suffered, who had had a similar operation performed under ether a few months before. Their condition was such that they were allowed—what is most unusual—indulgence in a wholesome dinner, which

was digested and assimilated as though under perfectly normal conditions. The advantages of thus being enable to feed liberally, and therefore maintain strength, and hasten convalescence are too evident to require further comment.

In abdominal operations it is natural to infer that the large dose of morphine administered would predispose to post-operative ileus. Thus far, in not a single instance did this troublesome condition develop. Such operations as lateral bowel anastomosis, cholecystectomy, and freeing intestinal bands and adhesions, which are so often followed by post-operative ileus, have been successfully completed.

The absence of nausea and vomiting commends narco-anesthesia most especially in the radical cure of hernia, and in the extensive plastic operations in pelvic surgery, such as are involved in operations for complete procidentia.

The absence of those blood changes that so commonly accompany ether anesthesia is another reason for selecting narco-anesthesia, especially where prolonged operative measures are necessary. Ophthalmic surgeons who have witnessed operations under narco-anesthesia inform me that iridectomy and cataract operations have been performed especially successfully; the absence of post-operative vomiting, for self-evident reasons, commending this form of unconsciousness in operations of this type. Operators who have witnessed this desirable anesthesia have requested me to induce the same conditions for them, and supra-pubic prostatectomy, amputation of the thigh for diabetic gangrene, and nephrectomy for tubercular kidney, have thus been performed in the most satisfactory manner.

In some eighty major operations, the delirium which has been the subject of comment as an accompaniment of scopolamine anesthesia, has not in one instance manifested itself with this manner of using the drug in combination, as described. "Twilight sleep" must not be confounded with narco-anesthesia.

In children, relatively large doses are necessary to produce absolute abolition of the pharyngeal reflexes, which renders tonsillectomy, and operation for the removal of adenoids, troublesome, insofar as the long care is concerned, because the degree of narco-anesthesia necessary means that the danger of the tongue falling back will continue from three to five hours after operation, thus necessitating the inconvenience of having an intelligent attendant seated by the bedside until the little patient has thoroughly recovered consciousness. With this exception, it possesses advantages far over-balancing those of ether anesthesia.

In operations upon the neck, such as thyroidectomy, and the enucleation of tubercular lymphatic glands, there is great freedom and ease of procedure, because of the absence of the turgescence of veins which the struggles of ether anesthesia invariably cause.

I know of instances of operation upon the brain, in seniles, where ether had to be abandoned, and the operation postponed, where later narco-anesthesia was induced, and the operation completed without any untoward symptoms whatsoever.

For the past three months the ease with which the anesthetic state is thus induced has determined me to save the patient the suffering incident to the removal of drains from the abdominal cavity, packings, etc., which certain procedures necessitate in the after-treatment. The injection of one-fiftieth of a grain of scopolamine, and one-sixth of a grain of morphine suffice, and this phase of post-operative after-treatment is carried on with a minimum of disturbance.

THE TRANSVERSE ABDOMINAL INCISION.

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In the *Boston Medical and Surgical Journal*, March 29, 1896, J. W. Elliott published a description of a modification of the McBurney incision for appendicectomy. A. E. Rockey of Portland, Ore., in the *Medical Record*, July-December, 1905, strongly recommended the transverse incision for work in the lower abdomen and called attention to the satisfaction with which the appendix could be removed through this incision. In January, 1906, Gwilym G. Davis of Philadelphia once more described this incision in the *Annals of Surgery*. Boeckman of St. Paul in the *St. Paul Medical Journal*, June, 1910, also called attention to this incision, for which he had been given credit by Charles F. Denny in the *Boston Medical and Surgical Journal*, June 3, 1909. Although Boeckman worked out this incision independently and without knowing that it had been used before, he gives Elliott the credit for having first described it.

Having been, since 1910, an ardent advocate of the transverse abdominal incision for all work in the upper abdomen, not excepting that upon the kidney and spleen, it took but a few trials of the Elliott incision to convince me that it was by all odds the most satisfactory incision for cases in which the so-called gridiron incision of McBurney or McArthur is ordinarily used, and even for the

cases in which the modifications recommended by Wier and Harrington are employed. In a certain percentage of cases bad results follow the incision recommended by Battle (*British Medical Journal*, 1895), Jalaguier (*La Presse Médicale*, 1897), Kammerer (*Annals of Surgery*, 1897), Lennander (*Centralblatt für Chirurgie*, 1898), and Edebohls (*Medical Record*, 1899). Even where primary healing takes place, it is probable that these bad results are due directly to nerve injury. As the nerves to the rectus muscle enter at right angles, any vertical incision must necessarily interrupt their continuity. The only reason for making any incision other than the gridiron is on account of the necessity for more room through which to carry out the operative procedure.

With the incision of Elliott ample space may be

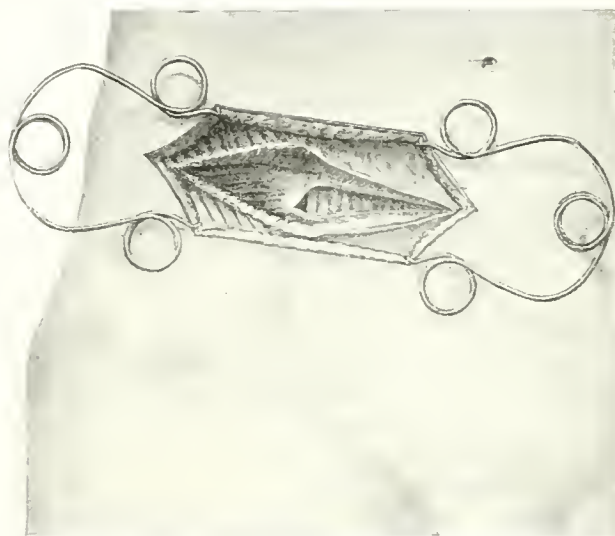


Figure 1.

obtained. Being nearly transverse, it severs the fibers of the external oblique in a diagonal direction. Although Boeckman states that these fibers are subsequently under some tension when closing the wound, such has not been my experience. I have found it possible in all cases to imbricate the layers with mattress sutures.

By continuing the incision to the midline and stripping the aponeurosis from the right rectus, this muscle may be retracted to the midline, and in this way an incision several inches in length may be obtained. The incision may be made at the level of the umbilicus or several inches below, depending upon the pathology one expects to encounter. In case drainage is necessary, I make it a rule here, as in all other localities where abdominal drainage is necessary, to provide a separate stab wound and to close the original incision, excepting in cases where one must of necessity leave the orig-

inal wound open. I know of but one hernia which has followed in my cases, and this in a case of suppurative appendicitis in a physician whose extensive drainage was carried out through the outer angle of the wound. As I have done most of this work under local anesthesia for some time past, I feel that I have given the method a very severe test.

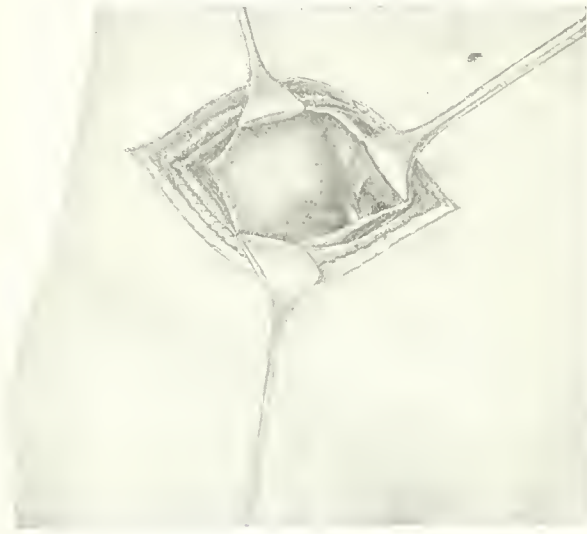


Figure 2.

With this incision and vertical retraction, and the patient rotated to the left thirty or forty degrees, we have been able in most cases to see the appendix lying in its natural position and in some cases we have been able to anesthetize this organ before liberating it from adhesions.

The following points of excellence may be mentioned, it seems to me: Sufficient room, conservation of nerve and blood supply, and the cosmetic result of closure.

SKIN CANCERS OF THE EXTREMITIES.

In considering the predisposing causes of cancer of extremities, Volkmann conveniently divided the cases into three groups, a classification which has been followed by a number of subsequent writers on the subject. The first group consisted of cases developing upon chronically inflamed tissue, as a result of ulcers, scars, fistulae, osteomyelitis, lupus, etc. The second group included cases developing upon warts or moles, either congenital or acquired in later years. The third group consisted of cases arising in apparently normal skin. In a series of 321 cases, von Brunn found that 227 could be placed in the first group, 46 in the second, and 48 in the third. It is thus seen that the majority of cases developed upon a chronic inflammatory basis. —HOWARD FOX in *The Journal of Cutaneous Diseases*.

AMBER COLOR OF SPINAL FLUID WITH COAGULATION EN MASSE—REPORT OF CASE.

WILLIS C. CAMPBELL, M.D., F.A.C.S.,

Professor of Orthopedic Surgery, University of Tennessee;
Orthopedic Surgeon to Memphis City, Baptist
Memorial, Lucy Brinkley, and St.
Joseph Hospitals,
MEMPHIS, TENN.

During the past year I have had under observation a boy showing unusual spinal symptoms with an amber-colored cerebro-spinal fluid, which coagulated en masse about one hour after spinal puncture in the lumbar region. An inflammatory condition was evident, but no classification could be made until I saw by chance a most excellent discussion of the condition with a complete review of the literature by Charles Mix* of Chicago.

The normal spinal fluid is clear and does not coagulate. A yellow color may occur after hemorrhage, but this has no bearing on the subject under discussion, unless associated with rapid coagulation en masse.

Spinal fluid bearing these properties has been found only in the lumbar region, and apparently occurs from any condition that may bring about a closing off of the lower canal into a separate compartment or cul-de-sac. Punctures higher give a clear fluid. Froin first described the condition in 1903, since which 34 cases have been reported, J. B. Murphy showing the last which instigated the investigation of Dr. Mix.

There are three types of spinal affections in which this condition has been found:

(1) Acute inflammations, as tubercular meningitis, which may arise as a result of vertebral infection. (Pott's disease.)

(2) Certain types of flaccid or spastic paralyses which have been shown at autopsy to be due to a pachymeningomyelitis, constricting the cord in the region of the conus, making a cul-de-sac of the lower canal.

(3) Spinal tumor may mechanically cause a blocking or may act as a ball valve, explaining variations in the character of the fluid in some cases.

My case is the 35th reported, the third observed in this country, but the first of the second type above described. The essential facts in the history are as follows:

W. H., age 14 years, was referred to Dr. E. D. Mitchell of this city, March 10, 1914, on account of a marked lordosis with severe pain in the lower extremities. His mother thought that he had in-

*Murphy Clinics, April, 1915.

jured the spine while vaulting. In November, 1913, albumen was found in the urine, which responded to treatment by the family physician. He had always been quite healthy and unusually strong. Family and past history negative. He first noticed slight pain in lumbar spine about September, 1913, which became gradually more severe and extended down both sciatic obturator and anterior crural nerves. At times the pain was almost unbearable.

Examination: Attitude erect, spine held somewhat stiff with marked lordosis. Movements in all joints of lower extremity painless and of normal range, but lordosis could not be affected by extreme flexion of the hips. Knee reflexes slightly increased. Side bending of the spine apparently normal. Flexion and hyper-extension markedly limited. No irregularity of the vertebrae could be seen. Rectal examination was negative. He was carried to the hospital in an automobile, and the slightest jar of the car gave pain. Skiagrams were made from the hip joints to the skull, all of which were negative. The day urine showed albumen present, but no casts, the night urine was negative (orthostatic albuminuria). The blood findings, including Wassermann reaction, were negative. Von Pirquet tuberculin test was also negative. I thought possibly a lumbo-sacral displacement as described by Goldthwait might exist. On March 14, 1914, the patient was placed under an anesthetic, when the lordosis automatically disappeared, and a cast was applied from suprasternal notch downward to left knee joint.

There was considerable relief until on March 20, 1914, the mother phoned that there was difficulty in micturition, great pain in the back of the head and both lower extremities, and that the temperature which had previously been normal was 101° . March 21st, he had two involuntary movements and the left lower extremity showed flaccid paralysis with weakness and absent knee jerk on the right side. Catheterization was also necessary. He was moved at once to the Baptist Hospital, where a neurological examination was made by Dr. Sommerville, who could give no further information. A lumbar puncture was made by Dr. Wm. Krauss, pathologist, who found difficulty in obtaining fluid on account of limited flexion, and coagulation of the fluid in the needle, but when the flow was free the tension was high, and much to our surprise the color amber or yellow and clear. Dr. Krauss reported lymphocytosis with coagulation en masse within forty minutes. All cultures were negative as was the Wassermann reaction. Unfortunately no animal tests were made.

Severe reaction with mild meningitic symptoms immediately followed the spinal puncture. The temperature rose to 103° , pulse 180, and the condition was desperate for the ensuing week. A large decubitus developed over the sacrum, and there was rapid loss of flesh until emaciation became extreme.

We thought possibly an atypical tubercular bone affection with localized meningitis existed, but numerous roentgenograms were negative, as was the tuberculin reaction. Malignancy was naturally

considered. Operation is advised by Murphy, but was absolutely out of the question on account of the grave condition of the patient. About this time I was using the Rollier sun treatment in quite a number of tubercular and other affections of the bones and joints with marked success, and I decided to apply it here, nothing better having been suggested.

On March 25, 1914, the boy was placed on a Bradford frame, sand bag under chest, face downward and the entire body exposed to the sun five minutes three times a day. The time was rapidly increased until he was exposed six hours per day. He pigmented rapidly and within two months he was bronzed. The improvement was slow but decided. The pain disappeared within a few weeks and muscular power was restored to both extremities. He did not gain in weight for 8 months. The pulse remained 100 to 120, temperature 98° to 100° for four months. He remained in the prone position, being easily managed as regards defecation and micturition. Flexion and hyperextension continued markedly limited, though side bending was quite free. Skiagrams every two months were negative.

On February 1, 1915, all active symptoms having subsided except limitation in flexion and hyper-extension, the patient was allowed to sit up. He soon began to crawl and by March 15th could take a few steps, since which time there has been rapid improvement in every way. At present, July 1, 1915, he can walk a mile and suffers no inconvenience. The spine is limited only slightly in flexion. The knee cannot be extended with the hip flexed above 60° . Weakness persists in tibials causing pes planus, which is without pain.

Repeated skiagrams, tuberculin tests and the subsequent course exclude involvement of the bones, and as a subsidence of symptoms would probably not have occurred in a spinal tumor, we naturally conclude that a chronic fibrinous pachymeningomyelitis with constriction in the region of the conus evidently existed as first shown by Cestan and Revaut at autopsy. Unfortunately we could not make punctures at a higher level or further lumbar punctures on account of the violent reaction following this procedure.

We cannot know the effect of the solar treatment from one case alone, but from the resolving action reported by many in tuberculosis of the vertebrae, we might assume the same effect to be possible when an inflammatory exudate occurs within the canal.

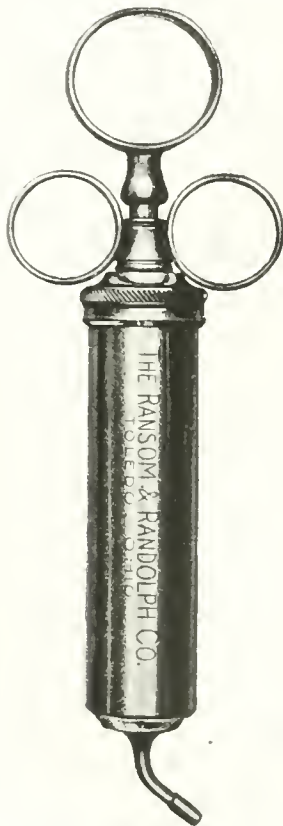
For a full discussion of the literature the reader is referred to the article of Mix.

Tumors of the testis not infrequently are accompanied by a collection of fluid in the tunica vaginalis. In such a case it would, of course, be a great mistake to regard the condition as a hydrocele only.

AN ALL-METAL SYRINGE FOR USE IN
LOCAL ANESTHESIA.J. H. JACOBSON, M.D., F.A.C.S.,
TOLEDO, OHIO.

The syringe here presented is a very practical one, intended for the injection of novocain and adrenalin solutions after the method of Braun, for the production of "leitungs" or conduction anesthesia.

It is not well adapted for the injection of small amounts of anesthetic solutions for the production of wheals after the Schleich method, although it can be so used.



The syringes which are ordinarily used for the injection of solutions for local anesthesia are usually of glass and metal and are of the Record type. These Record syringes are most excellent for the purpose, but they possess the disadvantage of being expensive and easily broken, while their repair is likewise expensive and attended by delay.

One of the prime requisites for the successful employment of the newer methods of local anesthesia lies in having a syringe that works perfectly, that is always ready for use, and that possesses the additional advantage of being inexpensive and easily sterilized.

The syringe which I am presenting is an all-metal one and has a capacity of about 15 cc. The

nozzle or tip of the syringe is made at an angle of 60° to the barrel and fits any of the needles made for the Record syringes.

The advantages claimed for this syringe are

First.—It can be sterilized without fear of injury by boiling with other instruments.

Second.—It is always ready for use.

Third.—It is inexpensive and can be replaced for less than what it costs to repair the glass and metal syringe.

The only disadvantage this syringe possesses is that the solution cannot be seen during the injection. This, however, is no great disadvantage because of the large amounts of solutions employed and on account of the ease with which the syringe is used after a little experience with it.

EXAMINATION FOR VESICAL MALIGNANCY.

Malignant vesical growths can often be felt by bimanual examination with the index finger of one hand in the rectum if the patient be a male, or in the vagina of the female and the other hand making firm deep pressure suprapubically. A tumor that can thus be felt is malignant. In advanced cases of vesical malignancy the pelvic and deep inguinal lymph nodes can also be palpated as multiple hard masses. Papillomata cannot be palpated, neither do they cause lymphatic involvement.—E. O. SMITH in *The Lancet-Clinic*.

AMERICAN SURGERY.

Our surgery is cosmopolitan, based on the best in all countries, improved upon and made a part of our practice. American practice is too broad to be national. It has the scientific spirit, and science knows no country.

Within 100 years we have seen the leadership of medical science pass from England to France, from France to Germany. Modesty prevents me from naming the country to which it will go next.—WM. J. MAYO in *The St. Paul Medical Journal*.

THE AMERICAN MEDICAL EDITORS' ASSOCIATION.

The annual meeting of this association will take place at the Hotel McAlpin, New York City, on October 18th and 19th. The executive session and reading of papers will occupy both these days, and the annual banquet will be held on the evening of the 19th.

The time and place of meeting selected this year afford to the members an opportunity to combine clinic visits with considerations of medical journalism.

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WALTER M. BRICKNER, M.D., Editor

NEW YORK, SEPTEMBER, 1915.

TWILIGHT SLEEP.

Now that the monthly, weekly and daily press are letting up on the flood of articles dealing with twilight sleep: now that the pioneers who have used this method in Freiburg, Kankakee, Kokomo and Paducah have finished reporting their series of 10,000 cases, the serious-minded medical man, relieved of the tempest, may calmly take stock of twilight sleep's achievements.

A harmless anesthetic applicable in childbirth has been wished for by every obstetrician, for harrowing indeed is the long-drawn-out suffering of the parturient woman. The announcement that a safe and effective narcotic had been discovered would ordinarily have been hailed with joy by the entire medical profession, in spite of the oft-repeated accusation that physicians at large are ultra-conservative and averse to radical changes. The old charge that doctors were forced by public clamor to accede to the use of ether and chloroform was true, but with the development of the means of communication, with the rapid changes in all branches of science, especially of the medical sciences, the profession has promptly and readily adapted itself to useful innovations. Why, then, has the announcement of twilight sleep produced such a tempest in a teapot? Why has it given rise to such acrimonious discussion. To the unprejudiced medical mind the answer is plain.

The first announcement of twilight sleep caused numerous European clinics to test—and later to reject—it. Today we are told that these tests were

not conclusive either because, at the time, the method had not been elaborated or because the technic of its introducers was not accurately followed. The second recrudescence of twilight sleep was engineered in the fashion of a whirlwind political campaign or a publicity propaganda in the hands of magazine writers, lay newspaper editors and department store lecturers. Unfortunately, a not inconsiderable number of medical men, for more or less altruistic reasons, allowed themselves to be carried away by the furor, and advocated the use of twilight sleep after more or less trial of it. Some authors have reported large series of successful cases.

What does success with twilight sleep imply? The method admittedly fails in at least fifteen per cent. of cases; it is not applicable in multiparae who have short labors; it can be used only in hospital surroundings with sufficient assistance and with the continuous presence of the obstetrician. Twilight sleep is thus at once limited in its employment to a relatively small number of fortunately situated individuals, because for most women either the necessary financial means or the necessary hospital opportunities are not available.

The shortcomings and actual dangers of twilight sleep are not entirely new to the profession, because semi-narcosis by scopolamine-morphine combinations had been tested out in this country in obstetrics and in surgery long before Kroenig and Gauss exploited its use by their method in Freiburg. Scopolamine is notoriously variable in its effect on different individuals, in some producing the desired ideal amnesia, in others causing wild hallucinations and violent delirium. Not infrequently it requires the united efforts of several nurses and the obstetrician to hold down in her bed the struggling patient who, it is true, can not later recall these scenes. Asepsis is necessarily impaired by these struggles.

Even the advocates of twilight sleep will freely acknowledge its non-success in a certain number of women, the production of delirium in some others, the lack of self-restraint in all the patients and the non-applicability of the method in a fair percentage of cases. The advocates never mention the fact that Nature has also established a wonderful amnesia for the sufferings of parturition, so that a few minutes or hours later they are quite forgotten. How common it is, during a labor to hear the pain-stricken mother cry: "Never, never will I have another child!" And how common it is to hear the same mother say, as she smilingly views her newborn: "Next year, I hope it will be a boy."

To relieve the suffering and exhaustion of a prolonged labor it has been customary to give sufficient morphine to produce a few hours of rest or sleep. Recently the acuity of individual pains has been dulled by short inhalations of nitrous oxide and oxygen—a method perfectly controllable, and easily applicable in the home. All modern obstetricians in the concluding stages induce unconsciousness with chloroform or ether.

Considering the manifold humanitarian efforts of the medical profession, is it fair of the advocates of twilight sleep—which include pamphleteers, journalists, obstetricians, and women—to accuse those doctors who refuse to be carried away by public clamor of inhumanity and of unprogressiveness? This is not the first stampede engineered by Kroenig and Gauts. Not many years ago they would have had us lay aside the scalpel and treat *all* uterine fibroids by broadsides of x-ray. Still more recently they also adjured us to abandon the knife in cancer of the uterus and place all our hope in radium and mesothorium. The short time elapsed has already shown that their claims were exaggerated, their enthusiasm unwarranted. The same exaggeration will have to be discounted in connection with their twilight sleep, and even greater allowance must be made because of the way the method has been exploited by others, both in the profession and out of it.—ROBERT T. FRANK.

THE CONGENITAL THEORY OF HERNIA EVOKES AN ARGUMENT.

In the June issue of the JOURNAL we expressed the belief that the ordinary abdominal herniae are practically never traumatic in origin, that they are always present, partly or fully developed, before the effort or accident to which they so often are attributed; and we referred to the excellent article of A. V. Moschcowitz on The Relation of Hernia to the Workmen's Compensation Law as supporting our view. Passing from the practical (economic) aspect of the question to its purely scientific and speculative side, we said: "We are *strongly inclined* to go further than does Moschcowitz and to accept the congenital *theory* of herniae, which assumes the presence in the hernial canal, from birth, of a projecting knuckle of peritoneum, which, however, may not become occupied by abdominal contents for many years." And we presented some of the many reasons why this theory is attractive.

Concerning this we have received the following letter:

New York, August 4, 1915.

Editor, AMERICAN JOURNAL OF SURGERY:

Absence from the city has prevented up to

now my reading the valuable editorial entitled, "Are Ordinary Herniae Ever Traumatic?", which appeared in the June number of your Journal, and which was evidently inspired by my article upon "The Relation of Hernia to the Workmen's Compensation Law." (*Medical Record*, April 3, 1915.)

Your editorial, however, goes much further than my article and dilates considerably upon the much discussed and moot question of the congenital theory of hernia. In previous publications upon the subject I have taken pains to emphasize the invalidity of the theory in general, except for such herniae of the congenital nature of which there can be no doubt; I would mention, as such, merely the "congenital inguinal hernia" so-called infantile herniae, herniae into the funicular process, umbilical herniae, and certain forms of diaphragmatic herniae. I concede now, and have always conceded, that there exists the "possibility" that the ordinary or oblique inguinal hernia is also of a congenital nature, but I have also repeatedly shown that all convincing proof of this contention is lacking as yet. To sum up, I would say that this part of the question is entirely an academic one, which can be settled neither by your affirmative editorial writings, nor by my denials.

The editorial in question, however, not only assumes as proven the congenital nature of all oblique inguinal and umbilical herniae, which, as been stated, may for the sake of peace, be conceded as debatable ground, but it goes yet further, and takes it for granted that the theory applies to direct inguinal and to femoral hernia as well. I am lead to this opinion by the following two statements: "The purely extraperitoneal forms of direct inguinal herniae may likewise be assumed to exist, potentially, at birth—an assumption that best explains their frequent bilaterality." And further on "and for femoral herniae it is not difficult also to conceive a small process of peritoneum existing at birth in the femoral fossa."

It is granted that it is not difficult to conceive such a theory, but in modern times surgical pathology requires much stronger evidence than the bare conception of a possibility before being accepted as valid. Murray's article (*Annals of Surgery*, vol. LII, p. 608) upon this subject is not in the slightest degree convincing. I maintain, therefore, my oft-made statements, that thus far all proof of the congenital nature of direct inguinal or femoral hernia is still lacking.—A. V. MOSCHCOWITZ.

Although this communication does not throw any light upon the subject, we print it because on the subject of hernia Moschcowitz is, we believe, eminent.

Dr. Moschcowitz read the editorial a bit hastily, we think. We did *not* "assume as proven" the congenital nature of all oblique inguinal and umbilical herniae." On the contrary, we referred to it

only as a "theory," an "assumption," "an hypothesis obviously difficult to prove." Nor did we "take it for granted that the theory applies to direct inguinal and to femoral hernia as well." Continuing clearly within the realm of speculation we indicated that the theory might be extended to these two latter varieties of hernia by *assuming* the congenital existence, potentially, of the extraperitoneal (direct) inguinal hernia and by *conceiving* a peritoneal projection in the femoral fossa at birth. (We quite appreciate that for these forms of hernia the congenital theory has no such support in fetal processes as have oblique inguinal and umbilical herniæ.) We hope that not many others of our readers think that by "assuming" and "conceiving" we mean "accepting," "believing" or "proving."

Moschcowitz says, "It is granted that it is not difficult to conceive such a theory"; that is all we said. He says the congenital theory of herniæ has not been proven; so did we. He says that the question is entirely an academic one; we said it is "of scientific rather than of practical interest." We admit that it can not be settled by our "affirmative editorial writings" and he admits that it also can not be settled by his denials. And so, aside from the fact that we "strongly incline to accept the congenital theory" and he admits its possibility and debatability, but also asserts its invalidity, we see no essential difference between Moschcowitz's stand and our own.—W. M. B.

Surgical Suggestions

In surgery, as in internal medicine, the thermometer is an indispensable instrument of diagnosis. The surgeon who, without examining his patient, attributes an unexpected post-operative rise of temperature to "the hot weather," "constipation" or "too much company" may find it difficult to explain later why he did not at once recognize the wound infection, phlebitis, pneumonia, cystitis or other complication that had developed.

There is a comparatively rare type of pelvic infection in women in which the pus points posteriorly through the sacro-sciatic foramen. Such a condition may be suspected if, after confinement, for example, an irregular fever is associated with pain in the lower lumbar and sacro-iliac regions, perhaps radiating into one or both thighs. Such an abscess may not be recognizable by vaginal or rectal palpation.

Surgical Sociology

Ira S. Wile, M. D., Department Editor.

SOME BENEFITS OF ASEPSIS.

The general benefits which have accrued from the development of aseptic surgery are well illustrated by the observations of Brewer (*Journal of American Medical Association*, April 24, 1915). In a report in the *New York Medical Journal*, May 2, 1896, Brewer bravely announced the fact that on his surgical service at the City Hospital for a period of 6 months, 20 per cent. of all clean operative wounds became infected. It must be recalled that at this period of surgery, modern sterilizing autoclaves were not to be found in hospitals. The degree of attention at present given to the preparation of ligatures and suture materials was absent. The modern training of surgical assistants was limited in extent and inferior in character.

During the following year, after a thorough bacteriological investigation of methods and material, and after the institution of a complete sterilizing equipment, the infected wounds, previously clean, fell to 9 per cent. In 1898 after the employment of sterile rubber gloves for the surgeons, assistants and nurses, the percentage of wound infections was reduced to 7. During the two ensuing years this percentage fell to 3.2. Surgery has now achieved a point in civil life where infection of clean cases is regarded as a reflection upon the technic of the surgeon.

The degree of care which must be employed in operating rooms varies naturally with the type of institution and the character of patients received. So many persons are involved in aseptic operative work that it is frequently difficult to determine upon the person responsible for the fault in technic when infection occurs. Hence censure always falls upon the operating surgeon.

That perfect asepsis may be maintained is splendidly demonstrated by the figures of Dr. Brewer of the cases operated on his service upon from January 1st to July 1st, 1914. Laying aside 4 patients who were infected in operations under local anesthesia by reason of a contaminated novocain solution, there was only 1 infection in 516 cases, or a little less than 0.02 per cent.

Interesting as a report of this nature may be from the standpoint of surgical technic, it possesses even more significance with relation to the welfare of the patients themselves. Primary healing of wounds means a shorter period of disability, less drain upon nutrition, a more rapid convalescence, a briefer stay at the hospital, decreased anxiety for the family as well as decreased expense. The hospital gains not alone through the decreased per capita cost for dressings, nursing and attendants, but is able to receive a larger number of patients per annum and establishes a reputation for clean and efficient surgical work. This last, of itself, is by no means an unimportant asset for any hospital.

With adequate hospital organization and sufficient funds to eliminate short cuts in the sterilization of materials, to develop systematic training of surgical assistants, it is possible to establish a surgical technic that will be eminently satisfactory up to the point of the actual technic of the operator himself. In the last analysis, the surgeon must bear the brunt of the shortcomings of his assistants and share with them his successes. The social benefits of the aseptic technic is to be regarded as of even greater importance than the mere determination of statistics with reference to the incidence of wound infection through lapses of hospital machinery and surgical skill.

THE TRAINING OF HEALTH OFFICERS.

The transformation which is slowly being evidenced in medical functions is well demonstrated by the new regulations authorized by the Public Health Council for New York State Health Officers. Beginning November 1st, 1916, local health officers must be specially qualified for their work. They must possess a preparation not generally obtainable, unfortunately, in medical colleges that will enable them to intelligently attack public health problems.

The prevention of epidemics, lay education in sanitary doctrine, together with a practical working knowledge of laboratory methods are among the rational subjects familiarity with which is to be insisted upon for public health officers. The qualifications for health officers as stated are as follows:

I. They shall be graduates of medicine of not less than three years' standing;

II. They shall when appointed be not less than twenty-four nor more than sixty-five years of age;

III. They shall have complied with one of the following requirements:

(a) They shall have taken a correspondence course in public health of one year with at least one week of practical demonstrations in laboratory and field work, both correspondence course and demonstrations to be approved by the Public Health Council, with examinations and a certificate; or

(b) They shall have taken a course in public health of at least six weeks, including practical laboratory and field work, with lectures and reading at an educational institution, such course to be approved by the Public Health Council, with examinations and a certificate; or

(c) They shall have submitted evidence satisfactory to the Public Health Council of special training or practical experience in public health work, with examination if required by the Council;

Provided, however, that under special conditions specified in writing by the local board of health or other appointing power or by the health officer, any of these qualifications may be waived by the Public Health Council.

In addition to the qualifications demanded by these resolutions it would be well if some knowledge regarding the nature and value of hospital organizations were insisted upon.

The public health officer in a small community is charged by the very nature of his position with manifold responsibilities not alone for the maintenance of the public health and the prevention of disease, but for the prevention of accidents and the organization of institutions for adequately coping with the dire results of industrialism.

Cooperative schemes for small communities may well be fostered through health officers with a view to establishing cooperative ambulance systems, first aid stations, and small general hospitals supported by several communities in the interests of all. Despite all "safety first" propaganda, accidents are bound to occur, and it is important that as much attention be given by health officers to this phase of the public health service as to securing adequate and just provision for the care of the abused leper or typhoid carrier.

Book Reviews

Text-Book on Nervous Diseases. By G. ASCHAEFFENBURG, H. CURSCHMANN, R. FINKELBURG, R. GAUPE, C. HIRSCH, FR. JAMIN, J. IBRAHIM, F. KRAUSE, M. LEWANDOWSKY, H. LIEPMANN, L. MÜLLER, H. SCHLESINGER, S. SCHOENBORN, H. STARCK and H. STEINERT. *Authorized English Edition*, edited by CHARLES W. BARR, P.S., M.D., Professor of Mental Diseases, University of Pennsylvania. In two octavo volumes: 1132 pages; 156 illustrations. Philadelphia: P. BLAKISTON'S SON & Co., 1915.

The eminence of the authors of this composite text-book needs no comment. To those familiar with this standard work in the German its excellence need not be pointed out. The translation has been done with care and judgment, and this American edition is altogether acceptable. To surgeons interested in this field we warmly commend the admirable sections dealing with the diagnosis and localization of various surgical affections of the brain and cord. The other diseases of the nervous system are also admirably dealt with.

Sleep and Sleeplessness. By H. ADDINGTON BRUCE, A.M. Duodecimo; 219 pages. Boston: LITTLE, BROWN & Co., 1915. \$1.00.

This book bears all the marks of having been written by a psychologist rather than a physician, thus narrowing its scope and utility appreciably. But within its limited sphere it answers all purposes satisfactorily. The author accepts Sidis' view that monotony is the central fact in the causation of sleep. His discussion of dreams has little in it of Freud's theories. When he comes to the topic of sleeplessness, he discusses only simple insomnia, excluding that associated with disease entirely. In the chapter on the treatment of sleeplessness, the author correctly warns against the indiscriminate use of drugs, and recommends treatment by psychology and hypnotism.

Essentials of Laboratory Diagnosis. By FRANCIS ASHLEY BAUGHT, M.D., Director of the Laboratory of the Department of Clinical Medicine, and assistant to the Professor of Clinical Medicine, Medico-Chirurgical College, Philadelphia, etc., etc. *Fifth Edition*. Duodecimo; 450 pages; 10 plates (four in colors), and 58 text engravings. Philadelphia: F. A. Davis Co., 1915. \$3.00.

This is one of the most satisfactory manuals upon laboratory diagnosis with which we are acquainted. The descriptions are terse and clear; there is no redundant matter, and the book has a thoroughly modern flavor. It is

questionable, however, whether sphygmomanometry and sphygmography should be included in a work of this character, even though the author is, as all know, especially interested in the subject. The illustrations are good, but those of instruments are too largely predominant. The work shows appropriate revision.

The Collected Papers of the Mayo Clinic, 1914, reviewed in the August issue, is \$7.00 in half morocco, \$5.50 in cloth.

Books Received

A Text-book of Chemistry and Chemical Uranalysis for Nurses. By HAROLD L. AMOSS, S.B., S.M., M.D., DR. P.H., Physiological Chemist, U. S. Bureau of Chemistry, etc. Duodecimo; 268 pages. Philadelphia and New York: LEA AND FEBIGER, 1915.

Mothercraft. By SARAH COMSTOCK. Duodecimo; 214 pages; illustrated. New York: HEARST'S INTERNATIONAL LIBRARY CO., 1915. \$1.00.

The Model T Ford Car. Its Construction, Operation and Repair. By VICTOR W. PAGE. Author of "The Modern Gasoline Automobile," etc. Duodecimo, 360 pages; over 100 specially made diagrams and half-tone illustrations, with two large folding plates. New York: THE NORMAN W. HENLEY PUBLISHING COMPANY. Price, \$1.00.

A New Ford Engine Chart. By VICTOR W. PAGE. Location of Ford Engine Troubles Made Easy. Size 25x38 inches. Printed on Heavy Bond Paper. New York: The Norman W. Henley Publishing Company. 25 cents.

Progress in Surgery

A Résumé of Recent Literature.

Ligation of the Splenic and Gastro-epiploica Sinistra Arteries in the Surgery of the Spleen. J. C. A. GERSTER, New York *Journal of the American Medical Association*, August 7, 1915.

Gerster believes that ligation, temporary or permanent, of the arterial supply of the spleen at certain more accessible points than the deeply situated splenic pedicle will greatly facilitate matters in difficult splenectomies. These points are (1) the splenic artery close to the celiac axis, and (2) the gastro-epiploica sinistra, where it reaches the stomach wall from the splenic artery. The celiac axis is readily exposed through an opening in the lesser omentum just above the lesser curvature of the stomach, and fully two inches of the splenic artery lie just beneath the posterior parietal peritoneum. This, however, does not shut off the entire arterial supply of the spleen, because of the free anastomosis of the gastro-epiploica sinistra (branch of the spleen) with the gastro-epiploica dextra. He proposes, therefore, that the gastro-epiploica sinistra be ligated where it reaches the stomach wall and just before it begins to send off branches to the anterior and posterior surfaces. This point is not so accessible as that described in the course of the splenic, but it is readily brought into view by drawing the stomach and left margin of the great omentum over to the right. The vasa brevia should theoretically also be ligated, but the anastomotic communications are rarely sufficiently large to demand this. There may still remain some hemorrhage from torn veins, but it is easier to control. After the spleen has been removed, the bleeding points in the stump of the pedicle can be recognized and ligated. If the liga-

tures on the gastro-epiploica sinistra are merely temporary, they may be released in succession so that if any minor arteries have been overlooked they can be caught up and tied. If, however, they are left untied, the pancreatic and vasa brevia branches of the splenic will be permanently put out of commission, but this should not lead to serious consequences, and the pancreas will still have a good arterial supply. Ligation of the splenic arterial supply as a substitute for splenectomy, as Lanz suggested, is believed by Gerster to be simpler, less shocking and more certain than an attempt to ligate the vessels in the pedicle when this is deeply situated and difficult of access.

Studies in Pancreatic Disease. E. B. CROHN, New York. *Archives of Internal Medicine*, April 15, 1915.

Crohn arrives at the following conclusions:

1. The quantitative examination of duodenal ferments is the most rational and accurate method of studying the external secretion of the pancreas. Diminution of such enzyme activity of the pancreas is a reliable sign of organic disease of the gland. Occasionally, though rarely, a diminution of ferments occurs as a symptom of advanced organic disease elsewhere in the body. Roughly, the diminution of ferments is directly proportional to the extent of organic destruction which has taken place.

2. The absorption of fat and nitrogen from the intestine is independent of the condition of the external secretion, or even of its presence. Absorption may be poor with an intact gland, or good with a gland of which only a fragment survives the disease. The functional activity of the gland, not its organic condition, determines the degree of absorption. This is probably controlled by an internal secretion or hormone.

3. Duodenal ferment tests give the index of the organic condition of the gland. Absorption tests give the index of the functional activity of the pancreas.

A Diagnostic Sign in Inflammatory Conditions and Traumatism in and About the Liver. MILTON BOOKMAN, New York. *Medical Record*, July 24, 1915.

This sign consists in making traction upon the round ligament of the liver by inserting the finger in the umbilicus and drawing sharply downward. If pain in the hepatic region is thereby caused, the test is positive. Bookman has found this test positive in some cases of acute cholecystitis, cholelithiasis, abscess of the liver, and in a case of traumatic laceration of the right coronary ligament. Further observations are necessary to prove the value of the test.

Basic Considerations in the Roentgen Study of Intestinal Stasis. J. T. CASE, Battle Creek, Mich. *The Pennsylvania Medical Journal*, June, 1915.

In a very complete and profusely illustrated article, Case gives an excellent survey of his methods of examining the gastro-intestinal tract by means of the x-ray, and of his interpretation of the findings.

He administers an x-ray test meal for breakfast. This consists of hot and cold food with two ounces of barium sulphate. Observations are made immediately after the breakfast and at the second, fifth, tenth, twenty-sixth, thirty-fourth and fiftieth hours. The following morning the colon is injected with an opaque enema. This is done between 9 and 11 A. M. At 7.30 A. M. the patient is given three enemata of warm water so as to insure emptying the colon. At 8 or 8.30 he takes his regular breakfast. Fluoroscopy is recommended as far more satisfactory than plates, since the important point is not the position of the various portions of the gut, but how they functionate. Only the first examination is made with the patient upright, the remainder being made in the recumbent position. The stomach should be empty after four and one-half hours at which observation the head of the barium column should have reached the cecum. The entire meal should have passed into the colon by the eighth or at most the tenth hour, when the head of the barium column should have reached the middle of the transverse colon. The iliac colon should be reached nine

to sixteen hours after ingestion, and the colon should be emptied after thirty-six hours.

The most frequent finding in constipated individuals is a marked spasticity of the left half of the colon.

In practically all cases of stasis in the proximal colon, the appendix shows signs of chronic periappendicular adhesions.

The author lays great stress on incompetency of the ileo-caecal valve in the production of stasis and thinks this of more importance than Lane's kinks or the various pericolic membranes. Stasis in a prolapsed transverse colon is practically never encountered. The writer does not seriously consider ptosis of the transverse colon as a cause of constipation, although it may be an associated condition. On the whole, the author is forced to conclude that in the majority of cases of constipation, the cause is located below the crest of the left ilium, and if not primarily due to spasticity, at least exhibits spasticity as an important factor.

Syphilis of the Stomach. F. SMITHIES, Chicago. *Journal of the American Medical Association*, August 14, 1915.

The results of a clinical study of twenty-six cases of dyspepsia associated with positive Wassermann-Noguchi reactions are reported by Smithies. In all these the diagnosis of syphilis was highly probable or was confirmed by exploratory laparotomy. He remarks that gastric syphilis is by no means so rare as was formerly considered, as no less than twenty-five cases have been reported in the United States during the past six years. The present series of twenty-six are taken from the examinations of 7,545 cases, making a percentage of about 0.34. There were gastric symptoms in a much larger number, a number of whom were syphilitic. The lesion may be congenital or acquired, and may produce several pathologic types, which may be summarized as those associated with chronic gastritis, ulceration, gastric tumor and perigastritis, often with an involvement of adjacent organs. Fifteen of the patients were men, eleven women. The minimum age was 20, the maximum 66, the average age being slightly greater in the men than in the women. Difficulty was met in some in obtaining a history of the primary sore, especially so in females, and the period passed before gastric symptoms is only approximately correct. The minimum period was four years in both sexes, the maximum for men thirty-eight years, and for women forty-five years. There were no congenital cases, and in all but two, the gastric disorder appeared in the tertiary stage. Only two of the whole number had had a thorough treatment of mercury and iodids. Three had taken salvarsan for "anemia," within four years of their coming under observation. The average duration of the dyspepsia was 8.7 years for the group, with practically no difference in the two sexes. The cases are classed in three groups: (1) Those in which a persistent gastric derangement appeared in persons previously healthy; (2) cases in which a constant dyspepsia followed years of antecedent intermittent indigestion, and (3) cases in which continuous gastric upset occurred in persons who had stomach trouble for some past period, but who had been free for some time. Each of these classes was studied in detail. In the second type the symptoms closely simulated gastric ulcer, but the gastric analysis revealed moderately high total and free hydrochloric acid with no increase above the normal formal index, and only irregular manifestations of positive Wolff tests. Even laparotomy sometimes left the matter in doubt. In the third group these symptoms were irregular, but the terminal stage laparotomy findings closely resembled those of the second type. The roentgenoscopy afforded no pathognomonic signs; but with a positive Wassermann-Noguchi test they afford a positively certain diagnosis. The best results in treatment were obtained by intravenous injection of salvarsan followed by a thorough mercurial course and iodids. Iron and arsenic are sometimes needed for the coincident anemia, and the dyspepsia may also need attention. Smithies thinks one should be cautious in making any definite statements about the cure of gastric syphilis, but four patients of the total twenty-six were relieved for so long as a year. Twelve patients appeared to be improved, and three were not benefited.

Subdiaphragmatic Inflammation, With a Syndrome of Physical Signs and Spontaneous Recovery Without Suppuration. R. I. LEE, *Journal American Medical Association*, April 17, 1915.

Lee discusses the subject of subdiaphragmatic inflammation occurring with a syndrome of physical signs and ending in spontaneous recovery without suppuration. He has recently had the opportunity of observing four cases of this type which he here reports. They seem, he says, to form a clinical entity differing from the frank suppurative conditions occurring in this region which, as Picque says, have an absolutely bad prognosis without surgical interference. All the cases here reported were alike in physical signs and Roentgen-ray showings. It was the ray that definitely decided that the condition was subdiaphragmatic. The last two cases were recognized clinically, and Lee says that it is possible or probable that many cases escape diagnosis from lack of roentgenization and that this class is larger than it appears to be. The roentgenogram is that of subdiaphragmatic abscess. Each case is commented on by the author after the case history, and the points of special interest are noted. This study, he says, contributes very little to the etiology, but it seems obvious that it must be of an infectious nature. In all cases the preliminary diagnosis was a lesion of the lungs or pleura. He also reports two cases of suppurative process below the diaphragm from the records of the Boston Hospital. Both patients recovered.

The Management of Burns. A. RAVOGLI, Cincinnati. *Journal of the American Medical Association*, July 24, 1915.

Ravogli says that to establish a line of management of all burns a priori would be somewhat preposterous. Following the doctrines of Hebra and accepting his division into three degrees, the pathologic process in each is different. In the first two there is inflammatory reaction of the skin, in the third degree there is primary necrosis. The degree of the burn, the medium producing it, the depth of the injury, the extent of the skin burned, and the condition of the nervous system of the patient all influence the treatment. In general, we can say the best treatment is that which favors the sloughing of the burned skin, which maintains the sterility of the resulting wound, and promotes granulation and the newly forming epidermis. The burn is always serious from the resulting shock and the action of poisonous substances arising from the burned skin. The treatment of the local lesion is only a part of that which is necessary; the general systemic effects have also to be taken into account. In severe burns the pain is intense, but after the burn is dressed and an injection of morphin is given, one-fourth grain, quiet is produced and some patients are able to give details of the accident. After a severe burn the patients do not usually void urine, and if they do, it is scanty and contains either blood or albumin. Sometimes even an apparently light burn may be dangerous to life. Removing the burned skin and deep blisters is risky and useless, as is also the washing with benzoin or gasoline. Time is necessary to give the burned tissues a chance to slough off, and even in second degree burns it is better to puncture the large blisters to let out the serum, leaving the old skin to protect the denuded papillae of the derma. A few hours after the burn fever occurs, and when the burned tissues begin to slough off, it shows the general systemic reaction. In the third degree burn the skin has been disorganized, and there is mortification of the tissues. The poisonous elements are formed in the skin and may be excreted by the urine, and this becomes poisonous. It is our duty to help Nature remove the burned tissue. An inflammatory process starts around the eschar with a groove separating it from the healthy tissues. The suppuration is effected in from eight to twelve days, and the resulting granulating wound is left with an irregular depth. Healing progresses from the periphery and from islands of epithelium. Several illustrations are given to show these processes. In a first degree burn the application of dry powders, such as talcum powder, bismuth or alum, is advised. In case of severe pain, Ravogli recommends application of compresses, moistened with a solu-

tion of aluminum subacetate, 2 to 5 per cent., and in second degree burns he applies the same. When the blisters are distended with serum he drains off the fluid by puncture. Oily substances, such as carron oil, etc., must be avoided as possibly aiding infection. When shreds of epidermis are easily detached, they are cut off with scissors and a thumb forceps. The Sneve treatment exposing the surface to plain air for an hour at first, and later two or three hours, is very useful. The treatment for a third degree burn is nearly the same. Recovery is obtained through cicatrization. The plain air and sunlight stimulate the granulating surface. It must not be forgotten that the granulations need to be touched with a solution of silver nitrate every other day to prevent irregular or keloidal scar. After exposure for from two to three hours the wound must be covered with a suitable dressing like a 2 per cent. borated petrolatum on English lint. When the granulations are pale and show a tendency to pus formation, the application of a mixture of castor oil and Peruvian balsam also gives good results. It cannot be continued over a long time on account of its producing irritation. In burned areas of large size without tendency to epidermis formation, a few Reverdin epidermic grafts will help. Any extensive burn of whatever degree has a systemic reaction. In the beginning the patient may suffer from shock, though in Ravogli's experience this has been rare. More often he has seen gastroduodenal ulceration with continuous vomiting and sometimes nephritis and pneumonia. The fever following the burn rises and falls somewhat like that of typhoid. In all his cases the administration of chinin has been very useful, and he considers it one of the best antiseptics. In nephritis the intravenous injection of Fisher's solution with the internal administration of digitalis has been very helpful, and in a few days the urine was clear of albumin. Gradually as the patient improves, when the fever is gone, a substantial diet with some iron tonic preparation to improve the general condition of the patient must be given.

Nerve Suture for Bullet Wounds. R. A. STONEY and H. MEADE, Dublin. *British Medical Journal*, July 3, 1915.

The function of a nerve may be interrupted without material injury, in which case the loss of function is only partial and returns early, probably always within a fortnight or three weeks.

When a nerve is partially or wholly divided loss of function is marked and permanent, and may even tend to increase. In these cases it is useless to expect spontaneous regeneration owing to the distortion and separation of the cut ends and the great development of dense fibrous tissue which appears to follow in all cases.

When a nerve is divided, the sooner an operation for its suture is performed the easier it is, and the greater the likelihood of an early cure. In cases, however, where the wound is septic, it may be advisable to allow time for the wound to heal.

Even when nothing has been done for several months, there is still a chance of a successful result if late suturing is undertaken, so that no case need be looked upon as necessarily hopeless.

Some Factors Concerning Amputations with Reference to the Present War. P. L. MUMMERY, London. *British Medical Journal*, June 5, 1915.

Inasmuch as the weight-bearing part of the stump is not on the end, but a greater or lesser distance above the end, it is a matter of little consequence that the scar is over the end of the stump. The surgeon should see, however, that the scar is not on the posterior aspect of the stump, because when the artificial leg is applied, this is the area of most friction. There should be no "point of election" in amputating. The "point of election" should be that giving the greatest possible length of stump. The best method of amputation is the circular, because the chances of the ends of nerves being caught in the scar is less than by flap methods. Finally, the artificial limb should be applied as early as possible, before atrophy of the muscles occurs from disuse.

Wounds Received in Battle. Surgical and General Observations Made During Recent Service in Austria. L. MILLS, Los Angeles. *Journal American Medical Association*, April 10, 1915.

Mills gives an account of his surgical and general observations made in Austria in the present war. While his specialty was eye cases, he was also employed in general surgery, and including 322 personal cases, he had the privilege of observing about 1,100 cases of projectile wounds and war injuries of various kinds. The large excess of bullet and shrapnel wounds seen in the Vienna hospitals, over wounds produced by shells, the reverse being the case on the French front, was due, he says, to the more mobile type of operation on the Russian border, shrapnel being generally employed against masses of troops in the open. The high percentage of infection accords with the English observations of the greater liability of shrapnel and shell wounds to such complication. Three out of four patients with tetanus recovered under treatment with antitoxin and chloral—a very good proportion. The diagnosis of war psychosis (traumatic neurosis) was made in only six cases, though the patients were often nervously upset by their wounds. Wounds of the left hand and forearm were very common, which he believes agrees with the experience elsewhere during this war. Several interesting vertebral wounds are mentioned, which recovered. Practically every close range shot of the cranium is fatal at once, from complete disruption of the brain, and fragmentation of the skull; but in wounds of the neck, the immunity of the great cervical vessels and nerves seemed remarkable. These are only a few of the points of interest which space permits us to mention in an abstract of this detailed paper. Mills ventures to say that the final statistics of this war will be quite different from any that have preceded it. The proportion of permanently disabled men seems greater than ever, and the immediate mortality is especially high.

Treatment of Gunshot Wounds of the Knee Joint. H. M. W. GRAY, France. *British Medical Journal*, July 10, 1915.

The war experiences of the author lead him to combat certain erroneous doctrines current in the treatment of gunshot wounds of the knee: 1. That suppurative infections of the joint demand free and prolonged drainage. 2. That drainage tubes are the best means for procuring this. 3. That these tubes must be large and must be inserted deep into the joint. 4. That strong antiseptic treatment is necessary to overcome this infection. On the other hand, he emphasizes certain important principles: 1. That all wounds of the joint demand immediate immobilization. 2. That all foreign bodies should be removed. 3. That the skin and superficial tissues must be excised in order to prevent infection from these sources. Gray summarizes his method in the following brief synopsis:

Excise wound of skin and superficial soiled or necrotic muscle and fascia. Enlarge wound freely if necessary. Remove foreign bodies (previously localized by x-rays) after possible enlargement of wound in synovial membrane. Flush synovial cavity with 5 per cent. saline solution. Thoroughly remove blood clot. In very acute cases make fresh incision. Trim edges of wound in synovial membrane, suture if sepsis not acute. Insert drainage tube down to but not through wound in synovial membrane. Fill rest of wound fairly firmly with "tablet and gauze" dressing. Inject formalin-glycerin or ether, etc., through fresh puncture. Clean and disinfect surrounding skin. Superficial dressings, light bandage. Immobilize in suitable splint. If this fails, free arthrotomy, possibly amputation.

Frontal Sinus Suppuration with Results of New Operative Procedure. H. A. LOTHROP, Boston. *Journal of the American Medical Association*, July 10, 1915.

Lothrop describes a method of operating for chronic frontal sinusitis in which all steps of the operation are open and a minimum scar is left, while the maximum opening into the nose remains. The disorder is kept up by

infection and obstruction, but by very free drainage and the sinus made easily accessible to treatment, the fistulas will close, subjective symptoms disappear and the discharge cease or be reduced to a minimum. In this paper he gives only the steps of the technic as based on the results of all the operations, a number of which are reported. It has been changed in certain details and is given at considerable length, requiring the illustrations for perfect clearness of detail. It consists practically of preliminary treatment intranasally, including removal of the anterior end of the middle turbinate and breaking up if needed of some of the neighboring ethmoid cells. Roentgen-ray examination should also be made with both lateral and anteroposterior views. The patient is etherized and put in a position midway between sitting and supine. The use of epinephrin is advised to avoid the annoyance of blood. A single curved 1-inch incision is made in the inner portion of the eyebrow, limited externally by the supra-orbital arch in order to avoid the nerve. The bone is bared of periosteum over the sinus, which is entered with a chisel and enlarged by rongeurs to make an oval opening. The region is explored with a probe, and pus, granulations and polyp gently removed and the probe passed through the ostium into the nose and left *in situ* as a guide. The cells on the floor of the sinus are broken up with small curved curets, carefully avoiding the posterior angle of the sinus. The operation is completed with the burr drills devised by Tilley and Ballinger for antrum operation and by rasps devised for this operation by H. A. Lothrop, using the rasps first. The interfrontal septum should be perforated and burred away so that the other sinus may be explored and the perpendicular plate of the ethmoid also removed by the burr. The use of the combined floor of both sides has been shown to be best even when only one sinus is affected. When sufficient bone has been removed from the perpendicular plate and the cells opposite the lacrimal bone, the neighboring ethmoid cells have been broken up with the large burr, the skin incision is to be closed without drain, and all tampons removed. Blood pressure may be lessened by propping up the patient. A compress bandage should be applied for a day or two, and after that a common dressing. If the antrum has served as a reservoir it is wise to make a large opening under the inferior turbinate. The subsequent treatment consists in keeping the nose clean.

A New Non-Operative Treatment of Disease of the Accessory Sinuses of the Nose. Preliminary report. L. A. COFFIN, *Medical Record* April 3, 1915.

By means of suction, Coffin is able to clean out the accessory cavities of the nose of purulent material without any further attempt at drainage. Then with positive pressure produced by the oxygen tank, he is able to throw medicated vapors into these cavities. After so doing, he is sometimes enabled to suck out considerable quantities of pus which remained behind. "The pressure current seems to sweep the pus from the walls of the cavities into such a position that the suction current can pick it up." The details and description of the apparatus will be given in a subsequent communication.

The Post-operative Antiseptic Treatment of the Tonsillar Fossae. G. P. MARQUIS, Chicago. *Journal of the American Medical Association*, July 10, 1915.

To prevent the inconvenient complications sometimes following tonsillar operations, such as reaction along the faucial pillars, edema of the uvula, soreness of throat, difficulty in swallowing and impaired speech, which he attributes to infection, Marquis recommends applying a 50 per cent. solution of tincture of iodine to the fossae immediately after removal of the tonsil. In spite of clean instruments and aseptic technic we have in the site of the removed tonsil an open space for invasion by the pathogenic bacteria always present in the oral cavity and the use of a powerful germicide is directly indicated. Of course all hemorrhage must be first controlled by a tampon saturated with alcohol, or if this fails, by a hemostat to the bleeding point. The fossa is then painted with the iodine solution, which is also carried onto the pillars and the uvula.

The Operative Removal of Large Intrathoracic Thyroids. (*Die operative Entfernung grosser Intrathorakaler Strumen.*) W. JEHN, Zurich. *Deutsche Zeitschrift für Chirurgie*, March, 1915.

Intrathoracic thyroids exert pressure on the trachea and the large vessels in the mediastinum. As a consequence the patient presents a picture of marked dyspnea and cyanosis with evidences of pronounced venous stasis and edema. For this condition relief is imperative. Jehn claims that with proper surgical technique and under favorable anesthesia these intrathoracic thyroids may be removed with safety and dispatch, and he cites five cases operated upon and relieved by Sauerbruch; one of these cases, however, died three weeks after operation from pulmonary embolism as confirmed by autopsy.

A low semi-circular incision was employed, the sternum in its upper portion then split longitudinally for 4 to 6 cm. This at once widened the upper thoracic opening by 1.5 cm. and almost immediately diminished, to a large degree, the dyspnea and lividity so prominent before this step was made. In all the cases oxygen was used during the operation under positive pressure (below 3 cm. water pressure, Tiegel apparatus); in only one case was a general anesthetic administered; the other cases received local anesthesia.

Fissuring the sternum alleviated the patient's distress, produced an increase of room in the thorax and so reduced the pressure effects, and lastly, permitted the introduction of the index finger into the upper mediastinum for exploration and enucleation of the intrathoracic portions of the thyroid tumor. Post-operative x-ray pictures confirmed the belief that the tumors had been removed in toto. Removal by morcellement is to be condemned because of the danger of hemorrhage in these vascular growths.

Luetic Bursopathy of Verneuil; Report of a Case of the Congenital type. W. P. CONES, Boston. *Boston Medical and Surgical Journal*, July 1, 1915.

This is an indolent affection of the bursae, and is independent of syphilitic arthritis. The syphilis may be congenital or acquired. The disease must be differentiated from subperiosteal abscess near the joints and from congenital specific arthropathy. While syphilis is the underlying cause, trauma is often the exciting cause. The Wasserman is frequently negative in these cases, but the diagnosis may be made by x-ray examination. "An indolent bursitis in a child, therefore, with or without traumatism, and with or without obvious signs of congenital specific disease, should arouse suspicion that we are dealing with a specific bursopathy of Verneuil. The author's case was a child, 13 years of age, who for two months had a marked swelling at the site of the olecranon bursa. The operation revealed gummy material and carious bone. The condition did not prove until specific treatment was given, when the result was magnal.

The Internal Aspects of Prostatic Suppuration. HARLOW BROOKS, New York. *Medical Record*, July 17, 1915.

Brooks calls attention to the frequent simulation by prostatic abscess of typhoid fever. The local symptoms are often absent or so slight as to be overlooked. On the other hand, there is an irregular fever, marked prostration and sweating. Curiously, the pulse is usually slow and the blood count is normal or even below normal, thus making the similitude more striking. Rectal examination usually clears the diagnosis.

Gluteal Myositis. N. SHARPE and P. W. ROBERTS, New York. *Medical Record*, June 26, 1915.

These authors describe 16 cases of a peculiar malady, characterized by pain, sharply localized, in the gluteal muscles. Usually the muscles involved are the gluteus medius and tensor fasciae femoris; occasionally the gluteus minimus and gluteus maximus. There is no induration or other evidence of acute inflammation. The cause is in nearly all instances a strain (excessive walking, lifting, etc.). Occasionally the gastro-intestinal tract

is disordered. In two cases, sciatica followed, due, according to the authors, to compression by the swelling of the muscle. In no instance was "rheumatism" the exciting cause. The only treatment that the authors found efficacious was deep massage. The majority required four to six weeks of treatment.

A Study of General and Localized Effects of Intravenous Injections of Colloidal Copper and Casein in Cases of Human Cancer. C. B. McCLURG, W. O. SWEET, H. N. LYON, M. L. FLEISCHER, and LEO LOEB, St. Louis. *Archives of Internal Medicine*, June 15, 1915.

This is a model report in every respect. The cases were well observed, and the biological effects of the injections were carefully studied. For our purposes only the clinical results need be reviewed. It can be definitely said that intravenous injections of colloidal copper have a definite effect in a certain number of tumors, while in others they are without any noticeable effect. The authors report a number of cancers of the skin that seem to have been cured by these injections, while in others there has been profound improvement. The injections of casein, on the other hand, had little or no effect upon the progress of the tumors.

Blood Transfusion; Indications; Results; General Management. R. OTTENBERG and E. LIBMAN, New York. *American Journal of Medical Sciences*, July, 1915.

This paper, containing their observations upon 189 cases, is so full of data that a complete review is impossible within the limitations at our command. We content ourselves, therefore, with a report of their more interesting conclusions. The most brilliant results were obtained where the indication for transfusion was hemorrhages. In hemorrhages from gastric and duodenal ulcer the results were brilliant; 12 of 14 cases recovered, and in all the conditions were desperate. In hemorrhage from typhoid fever, transfusion unquestionably saved life in two out of seven cases. "In all typhoid cases, the first appearance of blood in the stools should be an indication to make preparations so that a transfusion can be done, if needed, at very short notice." Ectopic pregnancy is an ideal indication for transfusion. The authors found transfusion of considerable value as a preliminary to surgical operations and against post-operative hemorrhage. In shock, the authors found transfusion of little value. In the various hemorrhagic conditions, such as purpura hemorrhagica and hemophilia, transfusion gave excellent results. In the latter condition, especially, the authors believe that repeated transfusions done at longer and shorter intervals may enable these patients to reach adult age. In combating the hemorrhages associated with cholemia, the results of transfusion were disappointing both as a prophylactic and as a curative measure. In pernicious anemia, transfusion is never curative; nevertheless the authors believe that it is the best remedy for this disease, because it leads to remissions in about half the cases, and thus prolongs life. In leukemia, the results of transfusion warrant a further trial. In infections with pyogenic organisms the results were good. In the subacute forms of streptococcus endocarditis, especially, transfusion may tide the patient over until the blood becomes bacteria free. The last part of this paper is devoted to the general management of transfusions and should be read in the original.

Threatened and Real Gangrene of the Extremities as Seen by the Modern Surgeon. Its Causes and Treatment. BERTRAM M. BERNHEIM, Baltimore. *Southern Medical Journal*, June, 1915.

The author considers the various types of gangrene of the extremities and their treatment. In dealing with threatened gangrene in arteriosclerotic individuals the operation of arteriovenous anastomosis is advocated. In these cases the limb presents a circulation slightly impaired, the main feature being most frequently a burning pain coupled with coldness of the foot and toes and severe

tingling and numbness. These patients become users of large amounts of morphine, as the pain is of a very severe variety. Hydrotherapy and baking should be tried, but if there is no relief, the femoral vessels had best be exposed and if found patent an arteriovenous anastomosis should be done. If occluded, amputation just above the knee is indicated.

The author deprecates the removal of thrombi as they immediately reform.

The artery should be tied off above and below the thrombus, and an end-to-end or a lateral anastomosis between vein and artery should be done. Or, if the thrombus is so extensive that it is impossible or inadvisable to get below it, a lateral suture between the artery and the vein above it, with a tie put on the vein proximal to the suture, is suggested.

The Futility of Arteriovenous Anastomosis in the Treatment of Impending Gangrene of the Lower Extremity. DEWITT STETTEN, New York. *Surgery, Gynecology and Obstetrics*, April, 1915.

As a result of eighteen experiments on amputated limbs, Stetten comes to the conclusion that even in cases of very advanced arterial disease, the arterial circulation is better and easier than the retrograde venous circulation, mainly because of the obstruction offered by the valves and the short-circuiting of the blood through anastomoses of neighboring venous collateral vessels. The operation of arteriovenous anastomosis is successful only in a small percentage of cases and is dangerous in itself. He believes that the successfully recorded operations are successful in spite of rather than because of the operation, circulatory improvement being impossible even if the anastomosis functionates. He regards the term "reversal of the circulation" absurd when clinically applied. He thinks the procedure should be banished from the surgical repertory.

Thrombosis and Embolism. ANGUS McLEAN, Detroit. *Surgery, Gynecology and Obstetrics*, April, 1915.

McLean does not see in endothelial damage *per se* which is usually strongly emphasized, a cause of thrombosis. The most important factors in the production of a thrombus are infection and necrosis or the toxins derived from an infectious and necrotic process. A slowing of the blood-stream is a contributory cause, but can not, of itself, cause a thrombus to form.

Late Results of Surgical Treatment for Flexed Scapulae, With a Discussion of the Subject. H. W. MARSHALL, Boston. *Boston Medical and Surgical Journal*, June 3, 1915.

Marshall reports on eleven cases operated upon at the Massachusetts General Hospital from 1908 to 1912. These patients were suffering from a painful condition of the back supposedly due to some anatomical malformation of the scapula of such a nature that the scapula grated against the ribs when the patient moved his arms. Goldthwait advocated as a cure for this condition, the surgical removal of the tips of the upper angle of the scapula, and the removal of any exostoses which might in any way impede free movement between the scapula and the chest proper.

These patients complain of pain in and about the scapula, radiating up behind the ears and down the arms. There is local tenderness and often crepitus. Most of the cases exhibit round shoulders.

Six of the eleven cases operated on returned for observation and two reported by letter. Six of these eight thought they had been much benefited. None are any the worse after the operation, and no objectionable after-effects of the operation have been noted. Good function in the shoulder returned after about three months. Mild cases recover without surgery, therefore medical treatment should be instituted in all cases. The most favorable cases for operation are middle-aged persons in otherwise good condition, and the worst cases are found in young individuals from fourteen to eighteen who are nervous and debilitated.

The Use of Magnesium Sulphate in the Treatment of Tetanus. S. J. MELTZER, New York. *Lancet*, June 26, 1915.

Any case of tetanus, mild or severe, should from the start to finish be treated by subcutaneous injections about every six hours with doses of magnesium sulphate. Cases having severe attacks should receive in addition an intraspinal injection. This may be repeated when necessary, but the subsequent doses should be slightly smaller than the preceding ones. If the attack contains an element of immediate danger an intravenous injection may be administered. When for one reason or another the intraspinal and intravenous injections are not practicable, the intramuscular injection plus ether anesthesia may be resorted to. When treating tetanus by magnesium sulphate, preparations for artificial respiration ought to be made in order to be able to use efficient doses of the salt. The pharyngeal insufflation device is the simplest and most reliable method for this purpose. When this device is not at hand, then oxygen should be administered by the method of intratracheal insufflation through the tracheotomy wound. The treatment of the failing respiration should be begun at an early stage; asphyxia of the tissues would thus be avoided and a complete restoration could be attained early. The treatment of tetanus by magnesium, of course, does not exclude its serum treatment.

For the dosage of magnesium sulphate by these various methods of administration the reader is referred to the original paper.

The Preparation of Diabetic Patients for Operation. T. ADDIS, San Francisco. *Journal American Medical Association*, April 3, 1915.

Addis rejects the dangers of infection and non-healing as of importance to be considered in operations on diabetics, and holds that diabetic coma is the only real danger that deserves consideration. Hence the common method of preparing diabetic patients for operation, by keeping them on a sugar-free and starch-free diet, is useless and worse, for it increases the chances of coma. When operation is not immediately called for, it would be of great advantage to supplement the clinical observations by some reliable objective data. The amount of sugar in the urine is no aid in this regard, as the danger to life is the failure, not of sugar, but of the fatty acid metabolism. There is no question as to diabetic coma unless oxybutyric acid or its salts are found in large amounts; and he thinks it probable that there is also a form of death in coma which is not caused by poisoning with acids. The coma in which diabetic patients die after operation is often, at least, accompanied by the excretion in the urine of large amounts of unoxidized fatty acids, but this does not give a reliable indication of the degree of danger. What is needed is a functional test of the fatty acid oxidizing power. The estimation of the degree of impairment of the power of the body to oxidize fatty acids is of prime importance in deciding whether or not operation is advisable. The inability of the kidneys to excrete large amounts of fatty acids is a factor in the production of diabetic coma. The giving of alkali helps the kidneys in this way; and it is important, before operation, to give alkali until the urine becomes alkaline and to maintain this reaction until after operation. Successful storage of glycogen in the body before operation or keeping the urine alkaline are neither absolute barriers against diabetic coma, but are only palliative measures. All the conditions which act together to produce shock serve as exciting causes of the condition known as diabetic coma.

The Use of Silver Leaf in Surgery. (*Die Verwendung von Silberplättchen in der Chirurgie.*) ERICH LEXER, Jena. *Zentralblatt für Chirurgie*, April 3, 1915.

Lexer speaks in unusually enthusiastic terms concerning the dressing of wounds with silver leaf, a method first introduced into surgery by Halsted. It is especially useful in plastic operations upon the face, because it enables one to obtain an almost invisible scar. He also regards silver leaf as the best dressing for skin grafts. He found it useful as a dressing for granulating wounds; the granulations remain flat and the epidermis is stimulated. He

applies the leaf in a single layer after cleansing the wound and then applies an ordinary gauze dressing. Lexer believes the silver leaf acts by its antiseptic properties.

The Treatment of Erysipelas and Other Forms of Dermal and Epidermal Inflammation With Carbolic Acid and Alcohol. ASPINWALL JUDD, New York; *New York Medical Journal*, June 12, 1915.

Judd describes some remarkable results following the use of carbolic acid in the treatment of erysipelas and similar conditions. He has used the treatment for a number of years and now has treated over one thousand cases. The treatment consists in painting the affected area and about one-half an inch of the healthy surrounding skin with ninety-five per cent. carbolic acid, followed by a swabbing with alcohol. The alcohol should not be applied until there is distinct whitening of the skin. Following this a wet dressing of any mild antiseptic is applied. This procedure may be carried out even on the most delicate parts of the skin. No scarring results. The temperature and pulse fall rapidly to normal. The general condition improves. There is often a discoloration of the urine, but no other symptoms of poisoning develop. The method does not seem to result as well in children, probably owing to the delicacy of their skin.

The Diagnostic Value of the Determination of Oxyproteic Acid in Carcinoma. (*Über die diagnostische Verwertbarkeit der Oxyproteinbestimmung bei Carcinom.*) M. DAMASK. *Wiener Klinische Wochenschrift*, May 13, 1915.

The author reviews the literature on the subject of a test for cancer consisting of a chemical examination of the urine for the determination of oxyproteic acid. This substance, as was first pointed out by Topfer in 1892, is found considerably increased in persons suffering from carcinoma. Considerable subsequent work by other investigators showed that the substance might also be present in increased amounts in other disease conditions. Damask, using the technic elaborated by Freund and Fellner, examined the urine of 121 cases, of which 42 were cases of carcinoma. In 35 of the cancer cases an excess of the acid was found, in 5 cases, i. e., 12 per cent., normal values were obtained. In the non-cancerous conditions, pregnancy and advanced tuberculosis showed somewhat high readings, but all the other pathological conditions gave normal amounts of the acid.

The author believes his results are of considerable value and advocates a more extended use of this chemical method of diagnosing cancer.

The Celluloid Tube in Finger Injuries. Its Use in Adding Length to the Terminal Phalanx After Traumatic Loss of Tissue. J. S. DAVIS, Baltimore. *Journal American Medical Association*, May 15, 1915.

Davis has found of great advantage the use of a celluloid sheet wrapped around the end of the finger in treatment of traumatic amputations, in order to produce a more satisfactory cosmetic and functional result. He uses sheet celluloid, 1-200 inch thick. The stump is painted with tincture of iodine, and the celluloid, after being soaked in mercuric chlorid solution, 1:1,000, for a sufficient time, is sponged off with ether or alcohol. It is then wrapped around the finger and secured as a slightly tapering tube with narrow adhesive strips. Properly adjusted, it will hug closely the edge of the wound, and will gradually become larger until it impinges on the first interphalangeal joint. The celluloid may extend as far beyond the finger tip as is needful, and serves also as a splint for the finger, and a protection for the wound. In cases seen early, a blood clot is allowed to form in the wound, and serves as a scaffold for granulations. If the soft parts are lacerated and spread apart, they are gathered together and held by the tube. Effort is made to stimulate the granulations and train their growth along the tube. Any desired medication can be poured in the tube, or packed in with gauze. A loose gauze plug is placed in the mouth of the tube, and over all a simple dressing secured by a bandage. This gives a longer finger, with improved function and appearance. Cases seen soon after the accident give best results.

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BLOOD TRANSFUSION WITH ONE 20 CCM. SYRINGE.

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The simplification of the technic of blood transfusion during the last few years is most gratifying. Vessel anastomosis, a most cumbersome procedure, was replaced by Lindeman's syringe method. The syringe method, in its original shape, was still, however, far from being simple. I have pointed out in detail the advantages and disadvantages of this method in a previous paper, entitled "Blood Transfusion by the Citrate Method,"¹ and therefore refrain from discussing the same subject in this short paper.

The syringe method was materially simplified when Unger² showed that the team work of two men (one aspirating the blood from the donor, the other injecting it into the recipient) could be replaced by an apparatus. He used a two-way stop-cock and while he was aspirating the blood, the vein of the donor was flushed with saline solution to prevent coagulation (and vice versa).

The late Morris Kush, an interne at Mt. Sinai Hospital, further simplified the combined apparatus-syringe method. Instead of turning a two-way stop-cock with the hand he has an automatic device, which insures the proper aspiration and injection of the blood, respectively. This apparatus has no attachment for the injection of saline solution, which Kush considered unnecessary. He thus dispensed with one assistant, needed for the proper working of the saline syringe.

In all these methods of transfusion (Lindeman, Unger, Kush) a 20 ccm. Record syringe is used. It is a well-known fact that after the syringe has been used two or three times for aspiration and injection the piston fails to work properly. It is generally assumed that two factors are responsible for this, first, the coagulation of the blood, and, second, the heating of the piston in the syringe. To overcome the first Lindeman provided for a thorough cleaning of each syringe on its way from recipient to donor. To provide against the heat-

ing of the piston he immersed the syringes in ice water.

Elsberg showed that both these factors can be overcome by a very simple device. He proved experimentally that an ether-spray will insure the steady and safe working of one syringe, in connection with an Unger or Kush apparatus, even if used for large transfusions. He suggested to Unger to chill with an ether spray the outside of the syringe during aspiration and injection of the blood. Thus Unger could reduce the number of syringes, used in connection with his apparatus, from 4 to 1, which simplified his method materially. The Kush apparatus can also be worked perfectly well with one syringe, as I know from my own experience, having used this apparatus a few times.

But any apparatus, perfect as it may be in its construction, is apt to get out of order and very often at the crucial moment. Such an accident happened to me during a transfusion. I was then about to continue this transfusion by the Citrate method¹, when it occurred to me that the apparatus was really not needed, and that the outfit left at my disposal—one syringe and an ether spray—would be sufficient to finish this transfusion successfully. I therefore proceeded to aspirate the blood from the donor's vein and to inject it into the recipient. I thus transfused 250 ccm. of blood and could have given larger quantities of blood without difficulty, if transfusion of a larger amount had been indicated. I have repeated this simple method in a case of secondary anemia, giving an eight-year-old child 230 ccm. of blood, thus raising the hemoglobin from 18% to 30%.

The outfit for this method of blood transfusion is most simple: Two cannulae, two pieces of rubber tubing, one 20 ccm. syringe, and an ether spray (ordinary hand atomizer). The recipient's vein is either punctured or exposed, the cannula introduced, and a piece of rubber tubing attached. The 20 ccm. syringe, containing some saline solution, is attached, and the saline solution is slowly injected, while the vein of the donor is punctured and the other piece of rubber tubing attached to the cannula. The syringe is now emptied of the

(1) *Surgery, Gynecology and Obstetrics*, July, 1915.
(2) *Journal of the American Medical Association*, 1915.

saline solution and filled with blood from the donor. The rubber tubing on the donor's side is compressed by an assistant, thus stopping the flow of the blood. This same assistant compresses the rubber tube on the recipient's arm after the injection of the blood in the syringe. Aspiration and injection are thus repeated, until the amount of blood required for the recipient is reached.

better for the recipient, if the blood is not transfused too quickly. A sudden overloading of the circulatory system is thus avoided.

Whereas the citrate method, which I described about six months ago,³ and which I have applied since then in a great many cases with perfect success, represented a new principle, the one-syringe method described in this paper cannot be consid-



Fig. 1. Aspiration of blood from the donor.

Meanwhile the ether spray, which can be worked by any untrained assistant, must be applied continuously to the piston of the syringe. It appears to the onlooker that the syringe works with the greatest ease all the time. Only the man who works the syringe will notice a slight difficulty now and then in pushing the piston forward. A few drops from the ether spray will overcome the slight difficulty and the piston will again slide up and down with perfect ease.

It is possible that a Lucr all glass syringe might give the same good results without the use of the ether spray. Furthermore, it might be feasible to use a 50 ccm. syringe instead of a 20 ccm. syringe.

The blood can be transferred from donor to recipient without any haste. In fact, I think it is

erred as a new procedure. In fact, the important part of the work on blood transfusion with the aid of syringes was done by others (Lindeman, Elsberg, Unger, Kush), and my contribution means only a further, though possibly the final step in simplifying the syringe method.

As to the relative value of the two methods (citrate blood and one-syringe transfusion) I still think that the former will be the method of choice. Though the recent progress in the technic of syringe transfusion has made it technically as easy as the citrate method, the advantages which I pointed out in my paper in favor of the citrated blood transfusion still hold. The two main advantages are that patient and donor are not in the same

(3) Medical Record, January, 1915.

room and that it is impossible to infect the donor's blood by the recipient's.

I have proved in my paper on the citrate method, that citrated blood is clinically just as effectual as unmixed blood. I hope that time will show the correctness of this statement and the absolute harmlessness of the citrate transfusion.

Those, however, who on theoretical grounds still favor the transfusion of unmixed blood, might try the simple one-syringe method above described. Both these methods will prove technically most

JOINT ADHESIONS.

If a joint requires loosening, or bony adhesions take place, motion should be stopped just as soon as it is loosened, and no attempt should be made to complete flexion and extension. This should be followed by the usual orthopedic treatment for an inflamed joint. Then the patient should be instructed gradually to begin using the joint, as the irritation disappears, which will be indicated by the lack of swelling and the disappearance of pain.—ARTHUR J. GILLETTE in the *J. A. M. A.*

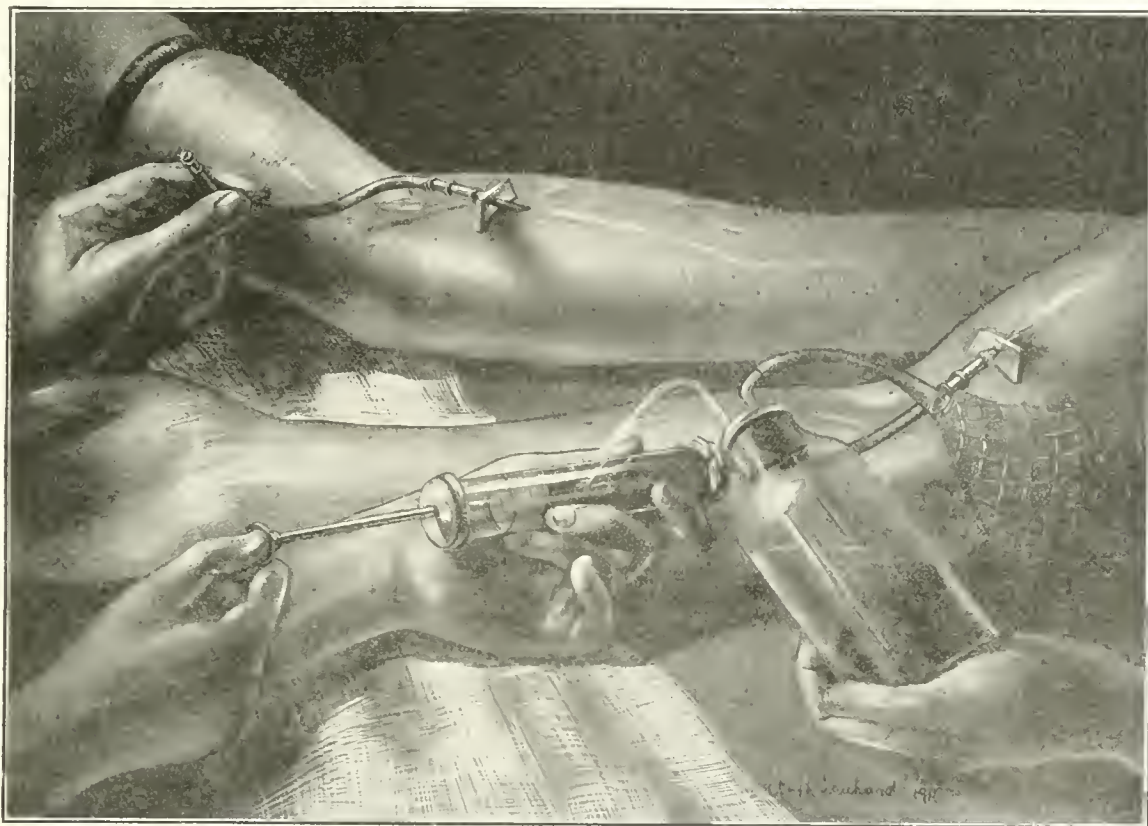


Fig. 2. Injection of blood into the recipient.

easy, even in the hands of men without previous experience in this work, and thus serve to popularize blood transfusion.

565 PARK AVENUE.

INTESTINAL RADIOGRAPHY.

Kinking at the duodenal-jejunal juncture may be difficult to find, but by filling the duodenum with pressure upward on the stomach, then rotating the patient to the left, the amount of retention in the duodenum should tell us the degree of obstruction.—A. JUDSON QUIMBY in *The American Journal of Roentgenology*.

POST-OPERATIVE THROMBOSIS.

Thrombosis, carrying with it the possibility of embolism, may develop after any type of operation. There seems to be a much smaller element of risk in the case of operations in the upper abdomen than in those involving the pelvic viscera. Prostatectomy and hysterectomy especially seem to be fraught with this form of risk. An idea of the frequency of thrombosis as a post-operative complication may be found from the statistics of Schenck, who finds that in 3,204 operations for uterine myoma in twelve different clinics, thrombosis developed in 96, or 3 per cent.—E. NOVAK in the *Interstate Medical Journal*.

THE QUESTION OF CONSULTATION IN
SURGICAL CASES.

An Address to Practitioners.

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If you had a patient suffering from the effects of an apparently slight infection after the trimming of a corn on one of his toes, you might refer the case to a surgeon or you might dress the wound yourself for a day or two or until recovery took place or until it became apparent that the infection was more rebellious than you at first supposed. In the latter circumstances it would be time for surgical counsel. You do not regard the matter very seriously, however, and you have a friend, Dr. B., who "does surgery," and whose work and judgment you believe to be good. Now, in a few days more an incision is made, with local anesthesia, a little pus being evacuated. The disease still progresses rather insidiously, and then comes a chill followed by high fever and of a sudden, as it were, the man's life is in danger. The question of amputation of the diseased limb is in your mind, and the same thought is shared by the surgeon and by the family of the patient who, taking alarm, decide that another opinion would be desirable and so inform you. The three interested parties having called the eminent Dr. S., a consultation is held, and Dr. S. decides that an amputation above the knee is necessary to save the patient. The question as to who is to operate now comes up, and Dr. S., the consultant, being an ethical practitioner, naturally assumes that it will be Dr. B. The family, however, has become thoroughly frightened at the grave aspect assumed by this apparently trivial case, and is now anxious to have the "best." What will be the final plan?

There are but three possibilities: First, that the people pay Dr. B., and dismiss him from the case. If this is done it is more than probable that the family physician will voluntarily withdraw. Second, that the family become reconciled to the idea of having him operate; and third, and most likely, that Dr. B. is permitted to operate but with the condition that Dr. S. shall be present. In this case all three medical men ought to be reasonably satisfied with their positions. The patient, however, has to pay Dr. S. a fee as great as, or even greater than, the charge made for the operation. In spite of the satisfaction over his recovery you may be sure that should a similar question arise in that family, they will be pretty apt to secure in the first

place the services of one who is capable from their point of view to carry the case to its conclusion and with whose work they think they would *in any event* be satisfied.

Some patients will accept the choice of their physician, regardless of the name or reputation of the specialist; others, who belong to the class of so-called nervous or difficult people, will be in the situation of those mentioned in my hypothetical case. It would undoubtedly have been wiser to have called in an unquestioned authority in the first instance.

I am convinced that there is a great deal in what may be called the training of patients by the doctor; which means simply that the physician has gained the confidence of his clientele to such a degree that what he advises is accepted without hesitation. Such a man will do far better than the more vacillating doctor who at the first hint of danger summons consultants by the score, thus often deferring action when promptness was essential. I am sure you have all seen lost among the wealthy lives that would probably have been saved had the patient occupied a bed in the hospital ward.

Case II. A young woman in the fourth week of typhoid suddenly cried out with pain and became somewhat shocked one morning at 7 o'clock, the temperature dropping from 103° to 98° F. Her physician was at once summoned and arrived at the bedside within thirty minutes. Realizing that some serious change had occurred he called for counsel, the patient being seen by the second physician at 9 o'clock. The pain had subsided, but the abdomen which had been scaphoid had become more normal in contour. The consultant frankly stated that he believed a perforation had occurred and that an operation was indicated. The consultation lasted half an hour and another hour elapsed before the surgeon arrived. He agreed as to the urgent necessity for operation, but the first physician was influenced by the relatives of the patient so that the advice of a famous consultant was sought. Delay of another hour. The third consultation was finished at about one o'clock. The result was that since the last consultant did not feel "perfectly sure" that a perforation had occurred a blood count was called for to clinch the matter. At least an hour was consumed in this laboratory work and all parties concerned met again at three o'clock. By this time there was decided rigidity and distension. The surgeon now insisted upon the opinion of the other gentlemen in a hypothetical case with all the circumstances similar to the one in hand but with the patient in

the charity ward instead of in the luxury of her home. Both medical consultants then admitted that an exploratory operation would be the probable procedure. Nine hours after the initial drop of temperature the operation was performed. A large perforation was easily found and closed, but there had been such extensive soiling of the peritoneum by intestinal contents that septic peritonitis was already well under way and the patient survived only twenty-four hours longer. She might have died even in spite of immediate operation, but success would at least have been more probable.

Surely, in a multitude of counselors there is *not* always wisdom.

Case III. A woman about 35 years of age with a history which seems to point to old gastric disease, is attacked with an apparently typical biliary colic. There is no jaundice, but the gall-bladder is easily palpable, tense and enlarged. After forty-eight hours the temperature rather suddenly rises to 104°; the pulse is rapid, but the patient does not give the impression of being in grave danger. You believe that this attack being primary, with only a vague history suggestive of earlier biliary trouble, a few hours more of medical treatment, or even one or two days may be followed by a subsidence of the symptoms. The family asks for consultation. Now, there is no doubt whatever that by the skilful selection of your consultant from a number of men equally distinguished in medical or surgical practice you can determine whether an abdominal section shall be performed at once, whether an operation after the subsidence of the attack shall be looked forward to, or whether the patient shall be treated for the present by purely medical means without the suggestion of surgery. Even of two surgeons one may be known for what is called his "radical" views and the other for his conservatism. I am using these terms in the sense in which they are taken by the general practitioner. Surgeons very frequently reverse the meaning of these two words, considering it far more conservative to remove a diseased organ whose presence appears to be endangering the patient's existence.

What is then the duty of the medical practitioner in a case of this kind?

It is obvious that if he is convinced of the necessity for an operation he ought to call the man whom he is reasonably sure will operate; but, on the other hand, we are all liable to error, so it may be as well to call the surgeon who is known to be conservative in the medical sense!

The only rule for safe guidance is to have the man who is known best for his experience and judg-

ment, and who will conscientiously consider and weigh all points of the case.

In the event of complete disagreement, a third consultant, medical or surgical, may be called to decide the question. Unless the light of another "specialty" is required this committee should never consist of more than three members. If at the time of the original disagreement the case appears to either one extremely urgent, the patient or his friends have the right to hear the arguments and to cast the deciding vote.

In other specialties than general surgery, this matter of decision by the physician whether Dr. A. or Dr. B. is to be called may become important. I know of one physician who maintains that he can at will predict whether a mastoid operation will be performed or not according to the particular otologist whom he may decide to call.

All this means that the responsibility which rests upon the shoulders of the practitioner, the man who was in the case from the beginning and who presumably knows the patient and his friends better than any consultant, is a grave one. I believe that his position is too rarely appreciated and that quite as much upon his good sense depends the welfare of the patient as upon the skill of the specialist. These arguments do not refer to the selection of any particular type of procedure—they simply refer to the question of operation or no operation.

If your patient is an old man with prostatic retention and hemorrhage, whose misery of existence is such that relief must be had, you will know that an operation is inevitable. Whether it shall be done by one method or by another will depend largely upon the operator selected, and knowing the character of the work performed by a surgeon the precise method employed need not concern you. It is a fact, however, that some progressive physicians do take pains to inquire into the various methods and particularly into the so-called "end-results," finally making the selection in accordance with their investigations.

The specialist draws most of his work from his colleagues who refer patients to him; yet I have known in my younger days that consultants are not invariably honest in their dealings with the physician who calls them. More than once I then noted the absence of certain patients from my waiting-room a suspiciously short time after the holding of a consultation and later on I learned that the consultant himself did not deem it beneath his dignity to continue the treatment which he no doubt conscientiously thought he could carry out better than I could. In one or two instances I was chagrined to find that not the consultant but his

assistant was taking care of my patient. Needless to say, I never gave an opportunity for a repetition of the offense in the same quarter.

The consultant should follow the Golden Rule in dealing with colleagues who may honor him by their choice. If the case requires special or operative therapy it is no more than fair that he should associate himself with the physician and should request his aid in carrying out a considerable part of the treatment. If the case has been an operative one many of the dressings can be perfectly well attended to by the physician.

Then, too, we must not lose sight of the fact that the physician is better acquainted with the purely medical aspect of the individual case than the surgeon is apt to be. It is, therefore, desirable for all concerned that the disease should be treated with the understanding that the operation is an incident, though usually an important one.

The least that a consultant can do is to return the patient to the man who sent him in fully as good a moral condition as he was when he came, with respect for his physician increased, not injured by thoughtless criticism.

Even in hospital ward service we should be as punctilious as in private practice. Whether limited to a specialty or doing general work the hospital "attending" stands in the light of consultant to *some physician* who treated the patient's illness before he entered the institution.

It has long been my custom to inquire personally from each patient at the time of his discharge from the hospital whether he had a family physician, and invariably to refer the patient back to him, either for general treatment, or in a case of incompletely healed wound, for surgical dressing. It too frequently happens that patients who are able to pay a small fee to a physician are completely pauperized by being referred to dispensaries on their discharge from the hospital.

I apologize for the desultory manner in which I have considered this subject and for the somewhat intimate character of the discussion. I recognize that the discourse is suited rather to the privacy of sympathetic conversation than to the pages of even the medical press, and were the matter of less importance I would have remained silent.

In the removal of the superior maxilla three procedures will be found of great help: intrapharyngeal or intratracheal anesthesia; temporary ligation of the common carotid artery to reduce hemorrhage; and the continuous removal of blood from the pharynx and the wound recesses with a suction apparatus.

GUNSHOT WOUNDS OF THE ABDOMEN.

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Gunshot wounds of the abdomen probably constitute a small percentage of surgical emergency work, but they are of sufficient frequency and of such formidable nature as to render imperative ready knowledge of their gravity and rational methods for their treatment.

We are primarily interested in the civil cases, but to obtain a clear idea of the proper method of treatment it is necessary to contrast observations in civil practice with those cases encountered on the battle field. It is the consensus of opinion among military surgeons that non-intervention is the best mode of treatment in military practice; and there are abundant statistics to prove the wisdom of their teaching. In civil life, however, surgeons should be equally unanimous in advocating immediate operation; and this presents no conflict in surgical practice or principle. The attitude of the military surgeon is one of expediency, that of the civil surgeon one of idealism. Different conditions obtain in military and civil life, and different modes of treatment are necessary.

In warfare the wound is usually inflicted by a small calibre steel jacketed missile propelled at high velocity. The wound produced is usually small and clean-cut, and in middle and remote ranges a minimum amount of damages is inflicted. These wounds are not nearly as likely to become infected as those encountered in civil practice. In civil life the bullet is usually larger, is not jacketed, is likely to be deformed, it is propelled at a low velocity, and causes extensive destruction of tissue. There is a great expenditure of energy when such a bullet strikes the human body. Infection of a wound of this character is very likely to occur.

In military practice the victim is usually young and strong and possesses greater power of resistance. The wounds are often inflicted while the patient is fasting, the alimentary canal being empty. In civil life the patients are often older, very frequently under the influence of alcohol at the time of injury, with the gastro-intestinal tract replete. It may be readily seen, therefore, that in war all conditions are more favorable for recovery of the patient without intervention, than are those found in civil practice.

Again, the facilities for treatment in war are inadequate to secure good results. An abdominal operation in a hastily constructed field hospital by overworked surgeons and nurses is almost if not quite as dangerous as the injury for which the

operation is undertaken. More often than otherwise the military surgeon does not see the patient in time to perform a successful operation, even had he the facilities for doing so.

La Garde is authority for the statement that all penetrating and perforating wounds of the abdomen, regardless of the viscera involved, gave a mortality of 92% in the Crimean War, 90% in the Civil War, 69% in the Franco-German War, 67.1% in the Spanish-American and Philippine Wars, 56% for the Russians wounded in Manchuria. Under the rule of non-operation, morphine, ice-bag and no food for days, De Sarlo reported 55% of cures in the Italo-Turkish War. At the 1914 meeting of the American Medical Association Rodman quoted authority for 15% mortality following operation for penetrating wounds in the first twelve hours, 44.6% for the second twelve hours, 67% for the third twelve hours, and 70% for the fourth twelve hours. These statistics of Rodman probably show a lower mortality than most statistics in civil practice, and one point is strongly emphasized, i. e., that early operation is imperative.

The prognosis in penetrating wounds of the abdomen depends upon a number of factors:

(1) It is possible for a bullet to enter the abdomen without inflicting any injury upon the viscera. This is rare and recovery will occur in all such cases unless the cavity is infected by the bullet or by foreign material carried with it.

(2) Wounds of solid viscera, if made with small calibre bullets and not infected, are more favorable than those of hollow viscera. The danger of hemorrhage is considerable; infection may also occur.

(3) Wounds of solid or hollow viscera involving large bloodvessels are dangerous, primarily because of hemorrhage, and secondarily because of infection.

(4) Wounds of hollow viscera are especially dangerous on account of the escape of septic contents into the abdominal cavity.

(5) Perforations of the small intestine are more dangerous than those of the large, the liquid contents of the intestine causing extensive extravasation and widespread infection of the peritoneum. The movement of the small intestine also contributes to the escape of the liquid contents and dissemination of the infection. Injuries to the large intestine are less dangerous than those of the small, and perforation of the stomach less than that of the large intestine.

(6) The number and character of the perforations must be considered. Simple perforations by

a small calibre bullet leave a small opening which is closed by prolapse of the intestinal mucosa, especially if the gut be empty. Larger perforations or those which are produced by the bullet striking obliquely, and those produced by the action of the bullet upon a hollow viscus that is distended with food or gas, are especially dangerous.

(7) The length of time elapsing between receipt of the injury and operation is of paramount importance in determining the outcome in a given case. The statistics of Rodman emphasize this point.

The symptoms of gunshot wounds of the abdomen present no definite indications of visceral perforation. Shock is extremely variable; there may be shock without penetration; there may be extensive intra-abdominal injury with little or no shock; the pulse is usually accelerated; it is not uncommon for it to be slightly above normal. Extensive hemorrhages resulting from laceration of large bloodvessels produce an extremely rapid pulse. In the great majority of instances shock in gunshot wounds of the abdomen really means hemorrhage. Pain is inconstant and unreliable; it may be great in non-penetrating wounds; it may be slight with multiple perforations. Vomiting, pain and shock when persistent indicate perforation; prolonged shock means hemorrhage.

It would appear, therefore, that there is nothing characteristic in the symptomatology, and it is precisely this point which should be emphasized. He who waits for the advent of characteristic symptoms, i. e., infection and peritonitis, has wasted valuable time, and has waited until there is no possibility of saving the patient.

In the majority of instances the only way in which a diagnosis can be made immediately after injury is by exploratory operation; and it is better that an hundred exploratory incisions be made that reveal nothing than that one case of perforation be undiscovered. This statement presupposes, of course, that the surgeon has adequate facilities for undertaking celiotomy. Under such circumstances the mortality of exploratory operation should be practically *nil*.

The diagnosis by exploratory celiotomy is the patient's safeguard in all instances in which the surgeon does not absolutely know that the wound is a non-penetrating one, provided always that the exploratory operation be done under aseptic technic.

It is the lack of proper facilities and time which makes the distinction between the course to be pursued by the military and that within reach of the civilian surgeon in penetrating wounds of the abdomen (Darnall).

The following six cases coming under my observation in the Louisville Public Hospital seem worthy of record. They will be briefly reported, all unimportant details being omitted. The patients were middle-aged negroes, some of them unpromising surgical subjects, and the injuries were inflicted during drunken brawls. It is interesting to note, however, that all of them recovered under prompt surgical intervention. In only one did the symptoms definitely indicate intraabdominal injury. In the others the increase in pulse rate was no more than might be expected from the excitement incident to being shot, and there was nothing in the symptomatology to indicate that the abdominal viscera had been penetrated.

The results secured in these six cases certainly justify the position that early exploration is imperative in all gunshot wounds of the abdomen where it is even suspected that visceral injury may have occurred. The probable outcome without exploration is too well understood to require further comment.

The importance of careful and thorough examination of the entire abdominal cavity cannot be too strongly emphasized. Many fatalities have undoubtedly occurred from overlooked perforations of the viscera. Whenever necessary one should not hesitate to make a transverse incision at right angles to the longitudinal incision to be absolutely certain that every injury to the viscera has been recognized and repaired. Even in movable portions of the intestine perforations are likely to be overlooked, and it is difficult to thoroughly examine the immovable portions through a median incision.

CASE I: Male, aged forty-one; weight about two hundred pounds; admitted in June, 1913, three hours after gunshot wound of abdomen inflicted by steel jacketed bullet. Pulse 95; temperature normal; patient suffering practically no pain; slight tenderness on pressure.

Celiotomy: Six perforations found in small intestine, two of them being so close together, and laceration so extensive, that resection was necessary; end-to-end anastomosis by direct suture. The other perforations were repaired by Lembert sutures. There was but little extravasation of the intestinal contents. Cavity cleansed with gauze, and cigarette drain inserted; drain removed in forty-eight hours. The patient made a satisfactory recovery.

CASE II: Male, aged forty-three; admitted in June, 1913, four hours after being shot with a 32 calibre revolver. The bullet entered the left side between the ninth and tenth ribs, and according to the history ranged downward. The patient was shot while in a crouching position, his assailant being in front and to the left. This man presented

practically no symptoms; there was but slight increase in pulse rate; no elevation of the temperature; no pain except during inspiration.

Celiotomy: median incision. It was found the bullet had ranged downward, penetrating the diaphragm and piercing the splenic flexure of the colon. As this could not readily be brought into the opening, a transverse incision was made from the median line to the left. The perforation in the colon was repaired by Lembert sutures; cavity cleansed by sponging; cigarette drain introduced; drain removed in forty-eight hours. Recovery was uninterrupted with exception of slight infection of the external wound.

CASE III: Male, aged thirty-seven; admitted in August, 1913, three hours after receiving a gunshot wound of the epigastrium. Pulse 100; temperature normal. The patient complained of no pain, and had not vomited.

Celiotomy: A considerable quantity of clotted blood found in the cavity; the bullet had perforated the anterior and posterior walls of stomach and also the left lobe of the liver. The stomach perforations were closed and the hemorrhage from the liver controlled by passing a strip of gauze through the bullet track and bringing it out at the upper angle of the abdominal incision. No further drainage was used. Recovery uneventful.

CASE IV: Male, aged forty; admitted in August, 1913, ten hours after stab wound in upper abdomen. Symptoms of hemorrhage present; temperature 99° F.; pulse 110; some dullness over the abdomen.

Celiotomy: It was found that the knife had been thrust in an upward direction, penetrating the left lobe of the liver from below and passing entirely through the diaphragm almost to the pleural covering. No intestinal injury discovered. There was a large quantity of blood in the cavity; the wound in the liver was still bleeding. Hemorrhage controlled by passing gauze through the liver wound and exerting pressure thereon by several sutures placed wide in hepatic tissue and tying them over the gauze. Drainage removed on the fourth day. Recovery uninterrupted.*

CASE V: Male, aged fifty; admitted in July, 1912, three hours after being shot in the abdomen. There were no symptoms indicative of intra-abdominal damage.

Celiotomy: Three perforations of the ileum found about two feet from ileo-cecal valve, and one perforation of the ascending colon, with considerable extravasation of intestinal contents. Intestinal wounds repaired in the usual manner; resection was unnecessary. Cavity carefully cleansed by sponging, and rubber drainage tube inserted; drain removed in forty-eight hours. Prompt recovery.

CASE VI: Male, aged forty-three; admitted in August, 1913, two hours after gunshot wound of the abdomen. The bullet ranged backward, striking a transverse process of a vertebra.

* This case is included in the series although it is not one of gunshot wound involving the abdominal viscera, the injury being inflicted with a knife.

Celiotomy: There was found a large perforation of the transverse colon, and some extravasation of intestinal contents. The perforation was carefully repaired; cavity cleansed by sponging; cigarette drainage for forty-eight hours. The patient made a good recovery.

More than forty years ago Sims advocated immediate celiotomy in gunshot wounds of the abdomen, and stated that "the danger consists not in opening the abdominal cavity but in keeping it closed, and the day will come when gunshot and other wounds of the abdomen and perforations of the intestine will be treated by opening the peritoneal cavity and washing out or drainage of the septic fluids."

Harbin believes the great fault lies in waiting for symptoms that indicate intestinal perforation. To follow such a policy is fatal in many instances. In case of doubt regarding intestinal perforation it is better to open the abdomen immediately. He says it is sometimes a long and tedious process to locate a small perforation, and cites an instance in which failure to find an abrasion of the intestine led to the development of a fecal fistula three weeks subsequent to the operation.

Martin successfully operated upon two patients with extensive gunshot wounds of the abdomen. One had a perforation of the small intestine and the bladder. The other had three perforations of the ileum and one of the transverse colon. In the latter case, operation was performed about an hour after receipt of the injury. The patient would have died from hemorrhage for there was active bleeding from one of the mesenteric vessels.

Keyes cites an instance in which there were twenty-two intestinal perforations. The cavity contained a small quantity of fluid feces, much clotted blood, and "probably some bile." The first portion of the jejunum examined showed eleven perforations; several were also found in the mesentery. Five of the intestinal perforations were closed with fine chromicized catgut, and about ten inches of another loop—containing six perforations, with extensive injury of the mesentery and bloodvessels—was excised, a Murphy button being inserted and doubly stitched with Lembert sutures. Eleven perforations were closed by Czerny-Lembert sutures of fine catgut. The peritoneal cavity and intestines were carefully sponged and the abdomen closed without drainage. The patient was discharged from the hospital on the twenty-seventh day.

From a study of fifty cases of penetrating abdominal wounds operated upon by six different surgeons, Branch presents the following conclusions:

(1) In all penetrating wounds of the abdomen

seen within twelve hours from time of injury, operation should be undertaken as promptly as consistent with good technic and skillful work.

(2) The incision should be made large enough to insure a good survey of the abdominal viscera without unduly exposing them.

(3) Extensive evisceration is unnecessary and unjustifiable, greatly increasing the mortality.

(4) Unless the peritoneum is extensively soiled, the intestinal contents should be wiped away with salt-gauze sponges; irrigation does more harm than good.

(5) If closure of the perforation or destruction of the blood supply seriously threaten the usefulness of a portion of the intestine, resection should be accomplished.

(6) If the peritoneal cavity is extensively soiled, drainage is safer; otherwise the incision may be closed.

(7) Post-operative treatment is very important; Fowler's position should be maintained.

Personally I have never considered irrigation of the cavity advisable, nor has Fowler's position been found especially advantageous, in the treatment of gunshot or other penetrating abdominal wounds. On the other hand, Guerry and other prominent surgeons practice thorough irrigation with saline solution in all such cases, and recommend the exaggerated Fowler position.

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OPERATIVE TREATMENT OF FRACTURES OF THE FEMUR.

I find that personally I am to-day operating more frequently upon fractures of the shaft of the femur, than I did formerly. I am finding that fractures in the upper third, in the middle, and in the lower third of the shaft, particularly in an adult, if the line of fracture is transverse or slightly oblique, recover with better knee and ankle joints if the long traction, made necessary by the non-operative treatment, is avoided. The restoration of the femoral shaft to its normal alignment, and the securing of the too often forgotten normal anterior curve of the femur, place the individual upon a better basis and the functional return to normal is hastened thereby.—CHARLES L. SCUDDER in *The Ohio State Medical Journal*.

LABORATORY AIDS AND THE EARLY
DIAGNOSIS OF CANCER.*FREDERIC E. SONDERN, M.D.,
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The pathologist as well as the clinician has far too frequent evidence that a malignant tumor reaches an inoperable stage before a diagnosis of its nature is made. This unfortunate oversight seems due to one or more of several causes. The delay on the part of the patient suffering from malignant disease in seeking medical advice; the tardy diagnosis of malignant disease by the clinician and a reluctance to have surgical counsel in suspicious cases, and the error of the surgeon in mistaking a malignant for a benign condition, are circumstances which are not within my province to discuss. It is with reference to the pathologist and his work in this connection that I would speak here.

Until relatively recent time, it was customary in a paper of this kind, to emphasize first and last, the imperative duty of the clinician to excise a portion of practically every suspicious growth for histologic study, for the purpose of justifying a radical operation if found malignant, and for preventing unnecessary mutilation if found benign. Further experience, statistics and research have demonstrated that this diagnostic procedure must be modified, that it occasionally is misleading and under some circumstances positively dangerous. It is our duty to call the attention of the profession to the fact that cutting through healthy tissue into a malignant growth is not devoid of danger. A committee of the American Society for the Control of Cancer has formulated a conservative opinion which should be given wide publicity. Their conclusions are briefly as follows:

In the removal of tumor tissue for diagnosis, the advantage of such microscopic examination, as well as the danger of aggravating the disease by this procedure, must be considered. In many cases the advantage of diagnosis outweighs the danger of removal of tissue for this purpose, and the procedure is justified in the opinion of the majority. The necessity for this may be determined by the skill of the clinician. Opposed to the procedure in general, is the danger of aggravating the condition by the excision, and this varies according to the nature and the position of the growth. To cut through the skin into a malignant tumor of the breast in order to remove a piece for examination is generally discountenanced. Errors in diagnosis

result from the excision of inflammatory tissue on the margin of a tumor when the section does not include tumor tissue, this being most frequent in the breast and in the prostate. Incisions into actively growing, deep-seated malignant tumors should be avoided as this may disseminate infection through the vessels, may permit extension or accelerate growth by relief of capsular tension. There is little danger, however, from the proper removal of tissue from any superficial growth of the skin or mucous membrane. Crushing or kneading malignant tissue should be carefully avoided under all circumstances.

In support of what has been said it is only necessary to quote the figures published by Bloodgood two years ago in his paper on Border-Line Pathological Lesions. He states, for example, that in some groups of malignant tumors as high as 50 per cent. of the cases are inoperable when they reach the surgeon. He is particularly emphatic on the danger of incomplete removal of a malignant growth of the breast even if this is followed by a radical operation days or weeks later after the microscopic examination of the tumor has been made. The same, I believe, applies to malignant disease of the prostate and bladder. Bloodgood states that in breast tumors clinically benign, if the radical operation immediately follows the exploratory incision which has revealed malignancy, the probability of cure is 80 per cent., while if the tumor alone is removed and this is followed by a radical operation at a later time, the probability of cure is less than 10 per cent. This is certainly an alarming statement and places an immense responsibility on the operating surgeon, tempered somewhat by the support of a frozen section made at the time of the operation by a competent tissue worker.

It is evident that the modern conception of dealing with malignant disease demands a more intimate knowledge of the gross appearance of tumors by the surgeon and the immediate radical removal of those which appear suspicious. Even so, the probable error is at least 10 per cent. and in some groups of tumors considerably higher. This percentage of error can be materially reduced by the examination of frozen sections during the operation without jeopardy to the patient. This additional safeguard will prevent unnecessary mutilation in some instances and will obviate the dangers attending the operation in two steps in others, but it will unfortunately not completely eliminate error as shown by the following experience. Parker Syms recently reported a case in which a quiescent fibroadenoma of the breast had existed for quite

*Read before the N. Y. County Medical Society, May 24, 1915, in cooperation with the American Society for the Control of Cancer.

a number of years. Owing to the development of an adjoining mass a radical operation was done at once. On subsequent examination of the specimen the original tumor was found to be of a perfectly benign nature, but the one adjoining it was a small, typical, rapidly growing carcinoma. It was the surgeon's clinical experience which led to the proper course, for the gross examination of the main tumor mass would have given a clear picture of a benign growth, and this would have been confirmed by a frozen section.

Experience teaches how necessary it is to continually remind the clinician of the importance of obtaining a proper piece of tissue when an excision for diagnosis is made and of the imperative need for immediate fixation of this tissue in a proper preservative, if a conclusive opinion is to result from the examination.

Although the diagnosis of syphilis has been greatly benefitted by modern serology, it is surprising how frequently extensive operations are undertaken for the unnecessary removal of syphilitic tissue. The exclusion of syphilis as a possible etiological factor cannot be too strongly urged.

Recent years have seen the development of various laboratory procedures in serology for the diagnosis of malignant disease and it is hoped that final perfection will lead to much benefit in the early diagnosis of cancer. As matters stand at the present time, the practical value of these methods is doubtful, and the clinician is not justified in supporting his opinion with these procedures, which have as yet none but theoretical merit.

PELVIC HERNIA.

In selecting the operative procedure for a given case of pelvic hernia, we should not be prejudiced in favor of any one operation because it may have been found to be efficacious in some or even in the great majority of cases as they present themselves. If we do so we will be liable to court failure by employing it in cases to which it is not adapted. Therefore, at the outset we should ascertain which of the individual structures are giving way and to what extent. We should also ascertain, if possible, which structures gave way first and which are still capable of functioning, or whether all of the supporting structures are giving way simultaneously or promiscuously. In other words, what was the beginning, what is the stage, what is the course, what the extent and what will be the end? Such an orientation will help us to determine how much operating, as well as what particular kind, must be done.—HENRY T. BYFORD in *The Chicago Medical Recorder*.

CANCER OF THE FEMALE GENITAL ORGANS.*

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In 1912 in the United States Registration Area there were 9,089 deaths recorded from cancer of the female genital organs, that is, probably from cancer of the uterus, ovaries, vagina and vulva. In the entire United States in the same proportion there would have been approximately 11,252 deaths from cancer of these organs. This is 25 per cent. of all cancer deaths in females, and 15 per cent. of all cancer deaths of both sexes.

These figures for the United States correspond almost exactly with those of Bashford for England and Wales, and doubtless correctly represent the frequency with which cancer occurs in these organs.

In the female genital organs individually, cancer is by far most frequent in the uterus, it is common in the ovary, and rare on the vulva and even more rare in the vagina.

Cancer of the female genital organs will be considered under the four headings:

1. Cancer of the vagina.
2. Cancer of the vulva.
3. Cancer of the ovaries.
4. Cancer of the uterus.

1. Cancer of the vagina—Primary carcinoma of the vagina is exceedingly rare. I have personally seen only one case. Secondary carcinoma is more common and in my personal experience it has occurred in three ways:

1. By contact or implantation.
2. By retrograde metastasis.
3. By peritoneal transplantation.

(1) By contact or implantation from a carcinoma of the cervix uteri a secondary growth may occur in the vagina. In these cases, there is a carcinomatous growth in the vagina separated from that in the cervix by an area of apparently normal vagina, and the explanation of the occurrence of the growth is that it is the result of the implantation of cancer cells by constant contact of the cervical growth with the vaginal mucous membrane.

There is no doubt that a carcinoma of the vagina secondary to one in the uterus occurs as it has been stated. It has been doubted by some observers that it occurs in the manner described as it is claimed that cancer cells could not become implanted on normal mucous membrane especially if it is con-

* Read before the N. Y. County Medical Society, May 24, 1915, in cooperation with the American Society for the Control of Cancer.

stantly bathed in septic discharges such as would be present in a case of carcinoma of the uterus.

(2) By retrograde metastasis, a secondary growth in the vagina may result from a carcinoma of the uterus by the cancer cells being conveyed in a direction opposite to the normal lymphatic current. This may be the result of the reversal of the lymphatic current, or possibly by "permeation" as has been described by Handley for carcinoma of the breast. A secondary growth in the vagina resulting from a retrograde metastasis is most frequently seen in deciduoma malignum.

That a secondary growth may be the result of a retrograde metastasis and not of an implantation or contact, is shown by the fact that in the early stage of some cases, the growth has not ulcerated. A contact growth would be ulcerated from the start.

(3) By peritoneal transplantation a growth may occur in the vagina secondary to any of the abdominal viscera. When a carcinoma of the stomach or of any of the other abdominal organs has extended through the peritoneal coats, cancer cells or pieces of malignant tissue may be separated from the primary growth and be free in the peritoneal cavity. By gravity, these cells or pieces of tissue sink to the lowest point of the peritoneal cavity, which in women is the cul-de-sac of Douglas. They may there become implanted on the anterior surface of the rectum or on the posterior wall of the vagina.

The appearance of a carcinoma of the vagina is the same whether it is a primary or a secondary growth. In the earliest stage, there may be a thickening of the tissues beneath the mucous membrane, but usually when seen it has ulcerated and has the characteristic hard elevated edges and sloughing center which are characteristic of an epithelioma.

Diagnosis.—Any ulceration in the vagina should be considered as a cancerous or a precancerous lesion. If a doubtful vaginal ulceration does not heal promptly, a piece should be removed for microscopic examination. If it proves to be benign, it should be watched until healed to be sure that it does not undergo a malignant change. If it proves to be malignant, proper treatment should be instituted without delay.

A primary carcinoma of the vagina can be removed and the results are usually favorable. A secondary growth usually, but not always, indicates that the primary growth is inoperable.

2. *Carcinoma of the vulva.* Though not common, carcinoma of the vulva occurs with sufficient frequency to demand that if any ulceration about

the vulva resists treatment, the possibility of a malignant growth should be considered. It is an external cancer, and with reasonable care by the patient and her physician, it should be recognized in an early stage during which its removal should effect a cure.

There are three lesions of the vulva which predispose to carcinoma. They are kraurosis, chronic eczema and leucoplakia. Any case in which any of these three conditions are present about the vulva should be carefully watched for the first sign of a malignant change.

Carcinoma of the vulva has the typical appearance of an epithelioma and the diagnosis is usually easy. If there is any doubt in regard to it, a piece of tissue should be removed for microscopic examination.

The treatment is the excision of the growth together with the inguinal glands of the affected side.

Cancer of the ovaries.—Frequency—Between two and three per cent. of the female cancer deaths result from malignant disease of the ovaries. This is about one tenth as many deaths as are recorded from cancer of the uterus. This, however, does not correctly indicate the frequency of malignant disease of the ovaries because many more of these cases are permanently cured than of cancer of the uterus.

Early symptoms.—The early symptoms of malignant disease of the ovaries are the same as the early symptoms of an ovarian cyst. In the early stage of an ovarian cyst, there may be no symptoms at all, or there may be the indefinite pelvic symptoms common to various pelvic lesions, such as pain in the lower abdomen, possibly limited to one side, backache, disturbance with the menstruation, function of the bladder or rectum, etc.—a group of symptoms indicating some pelvic lesion and necessitating a pelvic examination. It is by this pelvic examination that the diagnosis of ovarian cyst is made, but usually it is not possible to differentiate clinically between a benign and a malignant ovarian cyst in the early stage. In other words, the diagnosis of early ovarian cyst is made by a pelvic examination necessitated by an indefinite group of symptoms.

Treatment.—Assuming that there is no constitutional contraindication, *all ovarian cysts* should be removed as soon as possible after discovery. There are two reasons for this. One reason is that there is no clinical way to distinguish a benign from a malignant ovarian cyst. The other reason is that a benign ovarian cyst frequently changes its character and becomes malignant.

Carcinoma of the Uterus.

Frequency.—There are probably more deaths of females from carcinoma of the uterus than from cancer of any other organ.

Carcinoma of the uterus occurs in two forms—carcinoma of the cervix uteri and carcinoma of the fundus uteri.

Carcinoma of the cervix uteri, is the more frequent and the more malignant of the two varieties. It is rare in women who have had neither children nor miscarriages, the tendency to it is greater the larger the number of children a woman has had. There is no question that there is a direct relationship between the laceration of the cervix uteri resulting from child birth and the development of cervical cancer. It is probable that the erosion of the cervix, a lesion which is chronically inflamed and constantly bathed by irritating discharges, is the active factor in the construction of the malignant growth and not the scar tissue nor the repeated lacerations.

Of the causation of carcinoma of the fundus uteri, little is definitely known. Chronic inflammation and uterine polypi are sometimes considered possible causes.

Symptoms.—The diagnosis of early carcinoma of the cervix and of the fundus uteri cannot be made by subjective symptoms. There are, however, two symptoms common to carcinoma in either the fundus or the cervix of the uterus. They are the two symptoms which we should teach our patients as danger signals and which all physicians should consider absolute indications for a pelvic examination.

They are (1) any change in the menstruation and (2) any change in the vaginal discharge. The change in the menstruation may be an increase in the amount, frequency, or duration of the flow, or there may be a definite irregularity, such as "spotting" or flow in the middle of the month following physical irritation or without known cause. The change in the discharge may be the development of a discharge where there was none or a change in the amount or physical characteristics of an existing discharge.

A knowledge and the proper recognition of the importance of these two symptoms by women and by physicians would solve the problem of uterine cancer. If women knew the possible significance of these two symptoms and would report their appearance without delay to their physicians, and physicians would always make a pelvic examination, seeking counsel when necessary, the percentage of permanent cures following operations for cancer of the uterus would increase from less than five per

cent. to 50 or 75 per cent. Usually carcinoma of the uterus, especially when located in the fundus, is of a low grade of malignancy, and more favorable operative results should be obtained. More favorable results, however, will be obtained by earlier and not by more radical operations.

Treatment.—As a prophylactic measure, all cervical erosions or ulcerations should be cured. After the child bearing period has passed, this is usually best done by amputating the cervix. In every case all tissue removed should be subjected to a microscopic examination. In doubtful cases the immediate examination of a frozen section should be made.

Carcinoma of the cervix uteri with very rare exceptions can be diagnosed by a clinical examination. In an occasional case, the removal of a piece of tissue for examination will be indicated.

The treatment of a carcinoma of the cervix uteri is, of course, the removal of the uterus. In America this is almost universally done through the abdomen.

The treatment of a carcinoma of the fundus uteri must be considered for two classes of cases. (1) One, the positive cases, that is, the cases concerning the diagnosis of which there is no doubt, and (2) two, the doubtful cases, that is, for the cases which have a change in the menstruation or discharge and the cause of which has not been determined.

For the positive case, an abdominal hysterectomy is indicated.

For the doubtful case, the first indication is to establish the diagnosis. Assuming that there is no condition in the vagina or cervix to cause the irregular bleeding or discharge, the cause of the trouble must be in the interior of the uterus. It may be a small fibroid, an endometritis, a polyp, or a malignant condition, but the only way by which this can be determined in most cases is by a curettage. This should be done under conditions that an immediate hysterectomy can be performed if a malignant condition is found.

By a curettage, some cases can be definitely diagnosed as carcinoma of the fundus uteri by the appearance of the material removed and the feeling of the interior of the uterus. An immediate examination of a frozen section may confirm this diagnosis, but as a rule the examination of a frozen section of curettings is unsatisfactory.

In some cases by the removal of a fibroid or a polyp or a hypertrophied endometrium, the possibility of a malignant condition is positively removed by the microscopic examination of the tissue removed and by the cure of the discharge and bleeding.

Unfortunately there is another class of cases in which the diagnosis is left in doubt, either by the inability of the pathologist to make a positive diagnosis, or by the continuance of the symptoms after the curettage. These cases are the most difficult to treat. They require careful watching, possibly a second curettage and sometimes an hysterectomy.

Conclusions.

(1) If any ulceration of the vulva or vagina does not heal promptly, a piece should be removed for microscopic examination.

(2) It is impossible clinically to diagnose a malignant from a benign ovarian cyst in the early stages, therefore, if there are no constitutional contraindications all ovarian cysts should be removed as soon as diagnosed.

(3) Any change in the menstruation or the vaginal discharge must be considered suspicious symptoms, demanding an examination and such additional investigation to establish the diagnosis or to positively exclude a malignant condition.

TREATMENT OF MALIGNANT TUMOR GROWTHS BY RADIUM.

The closer the radium to the object the greater the effect of the rays. As the rays shoot out in every direction from the center the ideal course of treatment would be to have the radium as nearly as possible in the middle of the tumor. Therefore a malignant growth in one of the normal tubes of the body and within reach of radium application—as for instance, in the esophagus, or the rectum—is theoretically much more susceptible to treatment, especially if the malignant growth surrounds the canal, than where the neoplasm can be radiated from one surface only. If there is a sinus running to or through the tumor, or if it is in a location where it can be pierced to accommodate the insertion of the radium, satisfactory treatment can also be carried on. When neither of these methods is possible, we have to resort to what is called cross-raying or cross-firing. In this means of treatment we divide the radium into capsules and place it on the opposite sides of the growth, protecting the skin from the burning rays as much as possible by means of screens of different thickness. All these details are matters of technic and depend upon the individual patient and the disease as well as upon the experience of the operator and upon his personal equation.—JOSEPH BISSELL in *Radium*.

CANCER SURGERY.*

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If it is true that a large proportion, probably the majority, of cancers are, at their incidence, and for some time purely localized, then a considerable proportion of cancers should be curable; that is, by early and radical removal. What is the curability of cancer as seen in every-day practice? Are the cures obtained in any way proportionate to this presumptive curability? It must be conceded that a certain proportion of cancers are so virulent, so rapid in their development, that there never is a time when they can be seized and treated as a purely local condition except by some happy chance; i.e., the removal of the supposedly benign growth. Certain carcinomata, such as cancer of the pancreas, are, of course, evidently non-attackable by surgical methods. It is my belief that notwithstanding the great amount of attention devoted to the study of cancer and the improvement of diagnostic methods, especially in greater recourse to microscopic investigation, and notwithstanding the extraordinary development of operative technic resulting in the successful performance of formidable operations, very few patients are ever cured of a deep-seated cancer. It is conceded that occasionally individual operators are able to report an unusual series of successful cases or apparent cures. It is also conceded that many of the non-operative methods, such as x-ray and radium treatment, do have an influence on some forms of cancer, but it is not conceded that to-day these methods can be classed as curative.

Wherein lies the difficulty? It is generally complained, and rightly, by surgeons that patients come to operation too late; that is, the natural reluctance of the individual to undergo operative measures is held responsible. My belief is that that is considering the matter from the wrong end. I believe that the responsibility lies to a very great extent with us, the medical profession.

Of the cases of cancer that come to me personally, a large proportion are obviously hopelessly incurable and no operation, except occasionally palliative procedures of doubtful expediency, is possible; and even of those submitted to operation very few have reasonable expectancy of cure. We operate on many of these patients simply to give them what chance there is, as we know that occa-

*Read before the N. Y. County Medical Society, May 24, 1915, in co-operation with the American Society for the Control of Cancer.

sionally a seemingly hopeless case can be and is cured by a radical operation. An analysis of my recent cases of cancer reflects, I think, pretty accurately the present day situation, certainly in New York City. If the deplorable conditions shown by this analysis exist in a large city where good institutions and methods, special knowledge and skill are available, what can it be in the less favored communities?

Since February, 1913, there have been admitted to my service at the New York Hospital 110 cases of cancer. This list includes a small number of private patients, the bulk being made up of the class of cases predominant in the hospitals of New York City: that is, drawn largely from a floating population, many of them recent immigrants. Only cases confirmed by the microscopic examination obtained by removal of the tumor or a fragment of the growth in inoperable cases or in cases so hopelessly obvious, e.g., cancer of the liver with jaundice and ascites, are included. These cases have been divided into three classes:

1. Reasonable expectancy of cure.
2. Doubtful.
3. No probability of cure.

Under "Reasonable expectancy of cure" I have classified, for instance, small early carcinoma of the breast without involvement, on microscopic examination, of the axillary nodes; per contra, cancer of the breast with a demonstrated involvement of the axillary nodes can be classified as reasonably certain to die. The number of cases of reasonable expectancy of cure is 11, including some very mild conditions such as early epithelioma of the lip; the doubtful cases are limited to 6; but the third category, cases presenting no reasonable hope of cure by operation, numbers 93; that is, 84.5% of all cases admitted to my service at the New York Hospital in that time have practically little or no chance for cure even if submitted to operation. We have notes of the after condition or results in 91 patients, and of this number we know that 50 cases or 45.4% are already dead. Of the cases admitted in 1913 (40 cases) 27 or 67.5% are known to be dead; of the cases admitted in 1914 (54 cases) 19 or 35% are known to be dead; of the cases admitted in 1915 (16 cases) 4 or 25% are dead.

In the last twenty-eight consecutive cases efforts have been made to obtain details of the advice or opinion received by these patients from the first doctor consulted. This investigation shows conclusively that in surely 50¾ of the cases these patients, although often complaining of very significant symptoms, received no advice or treatment based

on recognition or possibly even suspicion of their condition. For example:

(a) ADENO-CARCINOMA OF RECTUM.

Ten years ago patient had hemorrhoids. Treated with cold packs and camphor vaseline. One year ago, recurrence of hemorrhoids which again yielded to same treatment. Four weeks ago became very much constipated. Castor oil and enema failed to produce normal result. Called in physician, who prescribed diet of milk, barley water and eggs with small amount of bread. Patient has been on diet since then.

(b) CARCINOMA OF BLADDER.

Two years ago blood in urine. When patient first noticed blood he consulted a doctor. Urine examined and patient told he had albumen. Treated with pills. No diagnosis made. Instructed to limit his drinking to two glasses of beer. Pills were taken daily for a whole year. A year ago patient consulted another doctor, who likewise examined his urine. Under care of this doctor for six months. Treated for kidney condition. Medicine given chiefly.

(c) EPITHELIOMA OF TONGUE.

Six weeks ago patient first noticed swelling at base of tongue. First physician consulted gave him a wash for his mouth and told him he had an abscess. He also made a blood test and told him it was negative.

(d) ADENO-CARCINOMA OF INTESTINES.

Two months ago patient first consulted a doctor, who told him he had tuberculosis of the glands. Two weeks later he consulted another doctor, who told him that he had a carcinoma.

(e) CARCINOMA OF THE STOMACH.

Patient first consulted a physician about a year ago for gastric condition. Patient was told he had gastric indigestion and anemia. Medicine was given, which relieved the belching of gas. Two weeks and four months later patient visited the same physician and was advised to take pepsin in milk and peptonized milk for his gastric condition. Iron was given for anemia. Four months ago patient again visited same physician and received a "tonic" and iron and arsenic, which he took in milk after meals. Two weeks before admission patient again saw physician and was advised to increase the doses of iron. Three weeks before admission physician had gastric contents analyzed and told patient he had hyperhypochohydria.

(f) EPITHELIOMA OF TONGUE.

First doctor consulted treated patient for rheu-

matism. He next went to a dentist and had some teeth pulled out.

The deplorable percentage of hopeless cases coupled with the investigation of the kind of advice given many of these unfortunates justifies me, I believe, in accusing our profession as responsible for a large proportion, perhaps the majority, of lost opportunities successfully to treat probably curable conditions. When I say "our profession" I use this term in a very wide sense. It may be objected that the class of patients in our wards is unfortunate in not having access to the highest class of talent. Most unfortunately, the advice and treatment given to these patients by an ignorant or irresponsible type of practitioner is frequently given to persons whose means, intelligence, and environment lead them back to seek the advice of the unquestioned leaders of the profession. Precisely the same kind of advice as received by my unfortunate ward patients has been given and is being given to-day by men who have held the highest honors obtainable in the medical profession in America. It is being

seems desirable that we should initiate and carry on this reform spontaneously rather than for it to be forced upon us by a revolt of the laity. I call your attention to what has happened in the reform of the medical schools and medical teaching in this country. The profession as a whole was well aware of the existence of many undesirable institutions and of their methods. We often talked of what should be done; but the present day improvement in medical teaching, and a very real improvement it is, had its origin in lay work which knocked off the lid which we hardly dared tilt and the dreadful mess was uncovered. Let us have lay co-operation, but if we elect to have it forced upon us, we shall find our usefulness, not to say prestige, subordinated.

You are justified in asking me to outline definitely how I propose to inaugurate and carry out such a revolution. We should study and keep ever in mind such statistics as are furnished by Mr. Hoffman of the American Society for the Control of Cancer and remember that a considerable propor-

ANALYSIS OF CANCER CASES.

From February, 1913.

Diagnosis.	No. of Cases.	No Prob-ability of Cure.	Reasonable Expectancy of Cure.	Doubtful.	Opera-tions.	Inopera-ble.	Deaths.
Carcinoma of breast	22	17	4	1	20	2	6
" " uterus	12	12	..	..	10	2	4
" " ovaries	2	1	..	1	2	..	1
" " fallopian tubes	1	..	1	..	1	..	1
" " liver	3	3	..	..	3	..	2
" " colon and rectum	19	19	..	..	15	3	13
" " pancreas	3	3	..	..	1	2	3
" " bladder	5	4	1	..	3	1	5
" " oesophagus	3	3	..	..	3	..	3
" " stomach	15	13	..	2	8	6	9
" " pelvic wall (secondary)	1	1	..	..	1	..	..
" " lymph nodes	1	1	..	..	1	..	..
" " jaws	3	3	..	..	2	1	2
Epithelioma of vulva	1	1	..	..	..	1	..
" " lip	5	2	1	2	5	..	..
" " tongue	10	8	2	..	6	4	1
" " penis	1	..	1	..	1	..	..
Endothelioma of neck	1	..	1	..	1	..	..
Adeno-carcinoma of omentum	1	1	..	..	1	..	1
" " "gall-bladder	1	1	..	..	1	..	..
	110	93	11	6	85	22	50

Notes:—1 case of carcinoma of the sigmoid refused operation. 1 case of carcinoma of the stomach refused operation. 1 case of carcinoma of the bladder was to return for operation; never returned.

given by men holding high rank as teachers and scientists. It is being given by men to whom you have listened with attention and admiration in this very hall—and unfortunately, the same kind of advice that is ordinarily considered to be the province of an irregular practitioner and charlatan is being given by men whose lives and actions might readily serve as Ian Maclaren's model of Dr. McClure; and notwithstanding the active propaganda made for the dissemination of knowledge I cannot see that we are making any appreciable headway towards a new order of things.

It seems to me that the remedy lies in an adoption of methods that are verily revolutionary. The revolution must start with our profession and it

tion of human beings of middle or mature life suffers and is destined to die from cancer. We must bear in mind the frequency of cancer in certain organs, such as the breast, uterus, and stomach. The profession must realize that the cancer question is to-day the big problem and the most serious of all unsettled questions—that so far we have made little or no headway against it. That success can only be hoped for in the adoption of new and more radical methods.

The practical application of these principles will be three fold:

1. Recognition and cure of pre-cancerous conditions.
2. Throwing overboard all classical diagnostic

formulae, e.g., cancer of the stomach recognized by great emaciation, pyloric obstruction, palpable tumor, and cachexia. These are terminal symptoms and consequently useless.

3. The recognition that many conditions cannot be diagnosticated in the curable stage with any frequency save by unusual methods. These procedures, such as exploratory laparotomy, should hereafter not be classed as extraordinary but as legitimate measures of prudent anticipation.

To none of us is given the faculty of making difficult diagnoses in all cases; but all of us can and should exhaust the ordinary means of investigation. Women showing abnormal bleeding should not be told without examination that the menopause is at fault. The patient with cancer of the rectum should not be given a foolish ointment for the bleeding piles which have not even a presumptive existence. No woman at any time should ever be told that a lump in the breast is "nothing." Even if we did nothing more than carry out conscientiously such suggestions, we should be making considerable headway, as most mistakes arise from carelessness rather than from ignorance.

I can best summarize by saying that we ought, every one of us, to be on the alert for possible cancer in its curable stage, and exhaust every possible effort that lies within our resources and intelligence.

BLADDER CANCER.

The first token of bladder cancer is hematuria, and particularly significant of malignancy in a middle-aged person is a suddenly appearing sharp hemorrhage, of a total character, with quite likely absence of bladder pain, and continuing several days without abatement in spite of treatment, and then ceasing just as abruptly as it began. Finally after a period of varying length, pain—not tenesmus—becomes a factor. . . . The initial characteristics of bladder carcinomata may continue without marked change for as long as two years or even longer, when infection becomes a super-added element, and then the patient's distress grows apace. Up to this time, frequency may not be an urgent symptom, but naturally with the onset of a cystitis, it becomes more and more so. . . . Hematuria, the first symptom of vesical carcinoma, continues for a time, then as suddenly ceases. After a period of either weeks or months it begins again. Again it ceases—but usually this attack has lasted longer. Henceforth the hematuria recurs at shorter intervals, lasts longer until finally it becomes continuous, at which time the patient's end is within measurable distance.—CLARENCE MARTIN, in *The Urologic and Cutaneous Review*.

THE GENERAL PRACTITIONER'S RESPONSIBILITY IN THE EARLY DIAGNOSIS OF CANCER.*

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About fifteen years ago Weir Mitchell delivered an address on "Precision in the treatment of chronic nervous diseases." His opening sentence was a very striking one: "In the consideration of medical problems there are three 'gnoses,'" the prognosis, the diagnosis, and the agnosis, especially the latter." I believe I can choose no better text than this for my consideration of the general practitioner's responsibility in the early diagnosis of cancer.

The prognosis of any case of cancer depends largely upon the stage in which it has been recognized. It is absolutely a local process in the early stages. The sooner its real nature is recognized, or *strongly suspected*, the better it is for the patient, provided the surgeon's aid is promptly invoked. Expressed mathematically, the prognosis is inversely as the length of time before the operation. The surgeon's knife is still the only cure in a vast majority of cases, and the earlier this is resorted to, the better the outlook. But, even late operations are of value. Thus, late operations, especially on the large intestine, may have wonderful results. Among such late operations I would refer especially to a man, fifty-one years of age, who came under my care in 1894. He had a large stenosing adenocarcinoma of the transverse colon. Dr. Lilienthal excised four inches of the transverse colon and a large wedge of the mesocolon which contained a large number of small metastatic nodules. The stenosis was so great that the lumen of the gut admitted only a lead pencil. Mr. Mandelbaum pronounced it to be a cylindrical celled adenocarcinoma. A radical cure was effected in spite of the fact that there were enlarged glands in the mesentery. He remained entirely well until one year ago (namely, twenty years, when another adenocarcinoma developed low down in the sigmoid. This was also operated upon by Dr. Lilienthal. At last report he is still well.

Furthermore, good results may follow late operations in spite of very bad prognoses given by pathologists. In 1908 Dr. Lilienthal operated upon a patient of mine, a man, forty-eight years of age, in whom I had made a diagnosis of malignant dis-

*Read before the N. Y. County Medical Society, May 24, 1915, in co-operation with the American Society for the Control of Cancer.

case in a dislocated testicle. The growth had been very rapid. Three eminent pathologists (Welch, Mandelbaum and Ewing) agreed in pronouncing it a very malignant infiltrating sarcoma. Yet, in spite of this, the patient has been well for seven years, and when last seen by me several weeks ago, there was not the slightest evidence of any recurrence anywhere. Finally, what seem to be late operations may yield the not infrequent agreeable surprise that the growth is of inflammatory origin or a gumma.

Secondly, the diagnosis. As regards the early diagnosis, the situation is by no means satisfactory. What is meant by an early diagnosis? Boas is right in stating that this is often a misnomer. An early diagnosis can be called such only if an early operation is thereby rendered possible. Theoretically considered, if this were possible, one should be able to recognize cancer in its earliest stages. But, when is this early stage? When the disease has become manifest only a very short time? Or, when a small palpable tumor has appeared, or even before this? Or, in the case of the stomach, before there is any disturbance of the motility, or when the chemism of the stomach is still intact? Or, finally, before there are any general symptoms?

How difficult this problem is may be judged from the statement of von Hansemann that 23 per cent. of carcinomata are discovered only at autopsy. Really early diagnoses will always be difficult on account of the peculiarity of many cases to remain latent for a long time; in other instances the disease is very malignant from the onset, so that when they are discovered, a large area has already become involved.

Nevertheless, there is a large group of cases in which relatively early diagnoses—diagnoses which will permit radical cure—can be made, if the general practitioner will only think of the possibility of cancer; if he will not wait for the development of general symptoms, which are always late manifestations; and if he will give proper attention to the local symptoms and will appraise them at their proper worth. If these local symptoms fail to yield to ordinary treatment in a very short time, this should always arouse suspicion in a patient over forty years of age. No time should be lost in palliative treatment. A diagnosis with the aid of our modern methods should be made.

There are as yet no specific rules for early diagnosis. It is just here where the general practitioner is placed in a sad plight. He is bewildered by the host of new methods, all of which claim to be specific, yet all of which have failed to stand the test of experience. As a result he loses confidence

in all of them, and distrusts everything, even the older methods.

These have been unduly neglected by many practitioners. I feel sure that if these older methods are properly used in connection with carefully taken histories, carefully studied symptoms, and if these are checked off by x-ray examinations, relatively early diagnoses can be made in a large number of cases. The suspicion of cancer will have been aroused early enough to enable one to recommend the all-important exploratory operation to settle the question.

No reliance should be placed on any one method—all are valuable. To depend on one procedure alone is dangerous. Especially dangerous is it to rely solely on x-ray results. Just as often as they shed light on the diagnosis, they equally often lead one astray. X-ray examinations should always be corroborated by some of the clinical findings. I refer especially to negative x-ray findings, for in my experience mistakes have been most frequent in such cases. A recent experience may be cited:

A man, fifty years of age, entered Mt. Sinai Hospital, with a six months' history of gastric discomfort after meals there was loss of weight and a moderate anemia. Otherwise, there were no symptoms of any kind. Several examinations showed occult blood and the absence of free hydrochloric acid. Palpation of the abdomen was absolutely negative. After a careful x-ray examination the report was made that the stomach was normal. In spite of this negative report, I felt convinced that the man had malignant disease and advised an exploratory operation in the hope of finding an early form of the disease. The laparotomy showed an inoperable carcinoma on the lesser curvature of the stomach.

This is by no means an exceptional experience. I believe that at the present time too much stress is laid upon x-ray findings. They should be relegated to their proper place, namely, they are only part of the examination. Where the x-ray findings agree with the results of the old clinical methods an invincible diagnosis has been made. But where they fail to substantiate the clinical findings, an exploratory operation should be insisted upon to clear up the discrepancy.

After all is said and done, the exploratory operation remains as the only crucial diagnostic and the only therapeutic measure. If the diagnosis has been made, it is the only means of cure; if the diagnosis has not been established, it is the only means to settle the doubt, and at the same time, it may render a radical cure possible, if cancer is the cause of the symptoms. The risks of exploratory operations to-day are less than two per cent.; they are infinitely less than those of the disease itself. The

rapidly improving statistics of the large clinics, like those of the Mayos and others, attest the correctness of these views. It may be accepted as a safe rule that when in doubt about symptoms in patients at the cancer age: *Don't wait, explore!* When we are sure of the diagnosis, we are also sure of the inevitable result if nothing is done. The general practitioner will have done his duty when he has *strongly suspected* the existence of a cancer in a given case; the exact diagnosis should be relegated to the surgeon and the pathologist.

And finally, we come to the agnosis, the most important of them all, as Weir Mitchell has said. I do not refer to the agnosis or the ignorance of cancer in general. Time will remedy that. The intensive investigations which are being conducted all over the world must yield a rich harvest. There is a different agnosis or ignorance which concerns us now. I refer to the ignorance of too many general practitioners who fail to give their patients their due, namely, intelligent care. I will admit that the conditions under which many general practitioners work are far from ideal, and if we were placed as they are, we might possibly follow in their footsteps. The fault is not altogether that of the physician, for a large share must be placed at the door of the patients, who can not or will not understand the careful physician in his endeavors to establish a diagnosis. They are not sufficiently loyal to stick to one physician, or to follow his advice, or to give him sufficient time to study their symptoms. They care not for the diagnosis; they only want relief from their symptoms. It is to be sincerely hoped that the campaign of education which is being vigorously waged will in time enlighten the people as to the need of intelligent co-operation. But this is only an explanation, not an excuse. There are still too many physicians whose only aim is to palliate symptoms and not to make a diagnosis. They fail to obtain proper histories; they do not examine their patients sufficiently; they allow palpable diagnoses to escape them. They permit the golden time for radical operations to slip by, since by their procrastination they convert operable cases into inoperable ones, so that when operations are finally performed they are palliative and not radical. It is here where the great reduction in cancer mortality is to be immediately obtained. Of what avail is it that the large clinics report increasingly better statistics of their operative results? They, after all, represent only a small proportion of the cases. It is the great field of patients who come under the care of the general practitioner which we must strive to reach. If the general practitioners can be awakened to their duty in suspecting the existence of cancer by the intelligent study of their patients, then an

enormous stride will have been made in the early diagnosis and cure of cancer.

We cannot lessen the number of cases of cancer as we can reduce the frequency of typhoid fever, tuberculosis, etc., by improved hygiene save in a small percentage of the occupational cancers. Hence, our only hope in reducing the cancer mortality is by this campaign of education of both patients and physicians.

THE DIAGNOSIS OF GASTRIC CANCERS.

- (1) Never diagnose cancer on a single symptom.
- (2) Suspect cancer in everyone who complains of gastric disturbance and prove otherwise.
- (3) Do not exclude cancer because of absence of tumor.
- (4) Do not exclude cancer because of absence of vomiting.
- (5) Do not exclude cancer because of absence of pain.
- (6) Do not exclude cancer because of absence of anorexia.
- (7) Do not exclude cancer because of absence of lactic acid bacilli or lactic acid.
- (8) Do not exclude cancer because of early age.
- (9) Do not exclude cancer because of normal or increased HCl.
- (10) Remember that blood in the stomach or stool is the most important symptom in the diagnosis of gastric cancer.
- (11) Hold suspect of cancer all cases that continue to show blood in the stomach or stool after proper treatment.
- (12) Hold suspect all those who show gastric disorders at the cancer age whether of sudden onset, old standing, or preceded by ulcer symptoms.
- (13) Hold suspect those who fail to get relief from proper treatment.
- (14) Consider syphilis in all cases of tumor. The tumor may be gumma. It is well to do a Wassermann reaction in all cases whether surely cancer or not.—JEROME MEYERS in the *Medical Record*.

POTT'S DISEASE.

Undoubtedly surgical measures in Pott's disease shorten the period of disability with a presumption of a rapid cure. But rapid cure, in the exact sense, cannot be obtained by any method of treatment in tuberculous spine disease. In comparison to conservative methods, bone transplantation followed by protective treatment shortens the duration of tuberculous spine disease many months. The early relief afforded patients from discomfort and pain following the operation is striking.—CHARLES M. JACORS in *The J. A. M. A.*

A NOTE ON THE EMPLOYMENT OF THE TRANSVERSE FASCIA IMBRICATING OPERATION FOR POST-OPER- ATIVE VENTRAL HERNIA.

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NEW YORK.

The poor results following operations for post-operative ventral hernia by the Blake overlapping method with vertical incision, the good results in umbilical hernioplasty with the transverse incision

Fig. 1.

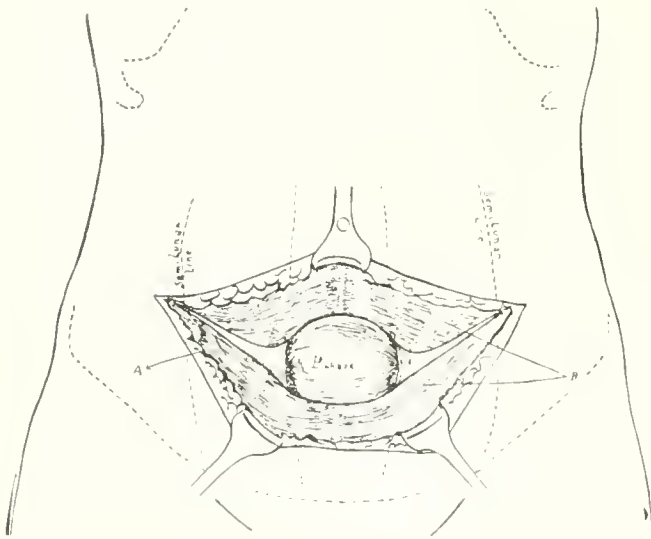


Fig. 1. A transverse incision is made at the level of the center of the hernial protusion, from outside one semilunar line across, to beyond the other semilunar line. This incision is made directly over the center of the ring and extends through the sheath of the rectus, splitting the oblique muscles at the sides. The hernial sack is seen protruding between the recti muscles.

by the methods of Mayo and Kelly, and the absence of hernia following laparotomy by transverse incisions, have led me to applying the method of Kelly to the surgery of post-operative ventral hernia.

The Mayo operation for umbilical hernia is well known and need not here be described. Kelly uses the same incision, extending it over the semilunar lines into the oblique muscles.

The same operation, slightly modified, may be used, also for hernia in the semilunar line or through the rectus. Make an incision, starting at the median line, transversely outward over the center of the sac, into the fascia of the oblique muscles, the outer part of the incision curving slightly upward to follow the line of the fibers.

Dissect up the outer sheath of the rectus and the fascia of the oblique muscles above and below for

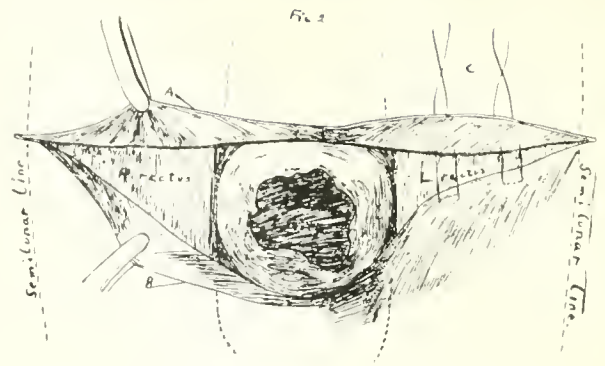


Fig. 2. Shows peritoneal cavity opening, sack removed, rectus sheath dissected free, and on one side the mattress sutures applied.

- A. Rectus fascia turned up.
- B. Rectus fascia turned down.
- C. Mattress sutures.

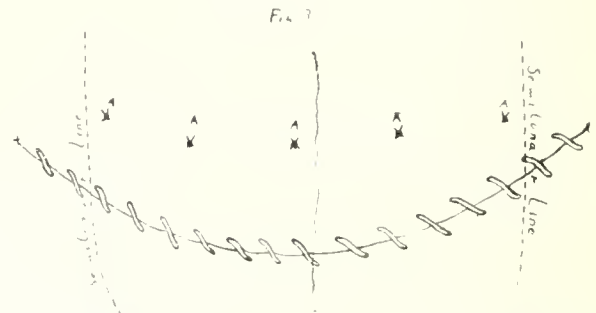


Fig. 3. Shows all mattress sutures tied and the lower edge of the upper flap sutured down to the lower flap with chromic catgut.

- A.A. Mattress sutures.

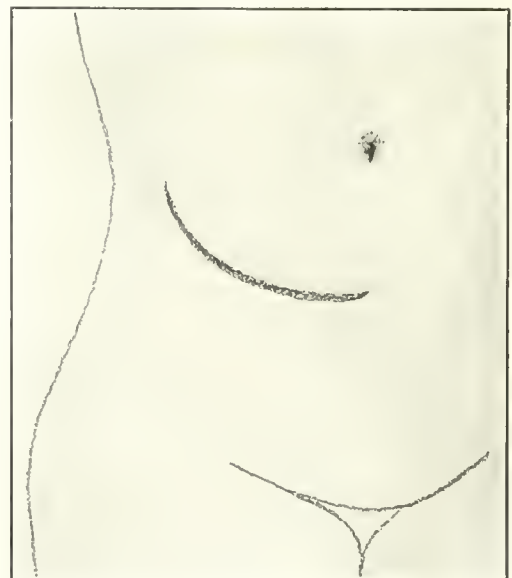


Fig. 4. Incision starts at median line, is carried over center of hernia, the outer end is curved upward in line of fibres of oblique muscles.

2 or 3 c. m. By starting the separation over the rectus the sac is more easily separated. This structure is now opened, the hernial contents are returned and the excess of sac is cut away, and the peritoneum is closed.

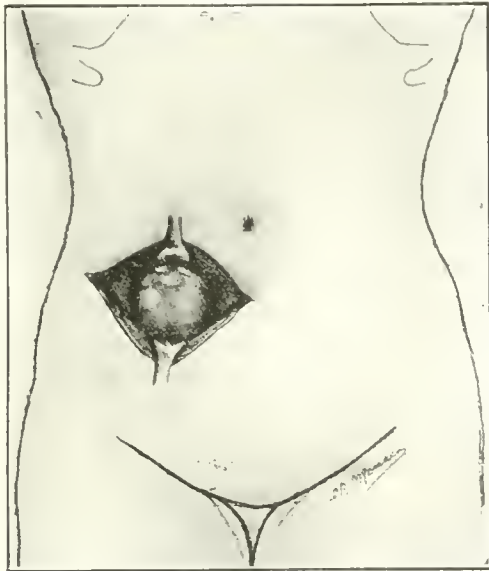


Fig. 5 Rectus sheath and fascia of oblique muscles retracted. Sack exposed.

The lower flap of aponeurosis is hauled up under the upper and fastened with three or four mattress sutures of chromicized catgut. The lower border of the upper flap is sewed on top of the lower flap with running suture of chromic gut.



Fig. 6 Mattress sutures tied and lower edge of upper flap sutured down to the lower flap with chromic gut.

The skin and fat are closed with catgut after cutting away the thin skin that covered the sac.

I believe this form of closure to be the most effectual yet devised. It introduces the Kelly principle of the strong drawing of the fascia upwards, starting well out on the sides, thus aiding the overlapping of the tissues at the hernial opening.

The steps of this operation are well shown in figures 1 to 6.

It is sometimes advisable to jack-knife the pa-

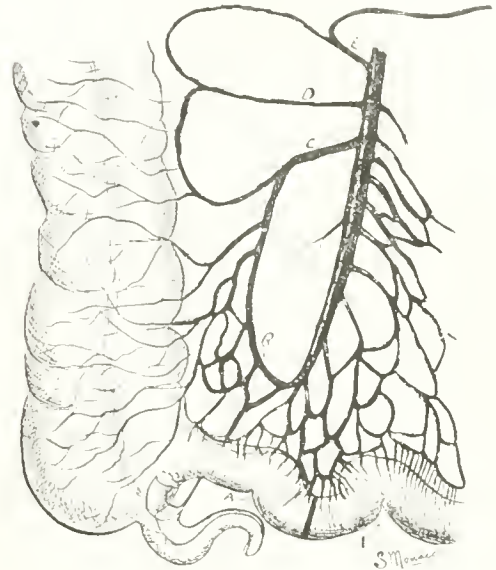


Fig. 7

- A. Ileum separated from its mesentery.
- B. Ileo-colic loop.
- C. Ileo-colic artery.
- D. Colica dextra.
- E. Colica media.
- F. Vasa intestinal tenuis

tient, by placing a pillow under the knees, to relieve tension on the wound.

The results in eight operations, of which the last was done a year ago, have been perfect.

I have combined the procedure in a number of instances with resection of a large area of fat from the abdominal wall (lipectomy) as Kelly does with umbilical hernia.

220 WEST NINETY-EIGHTH STREET.

· FRACTURE SPECIALISTS.

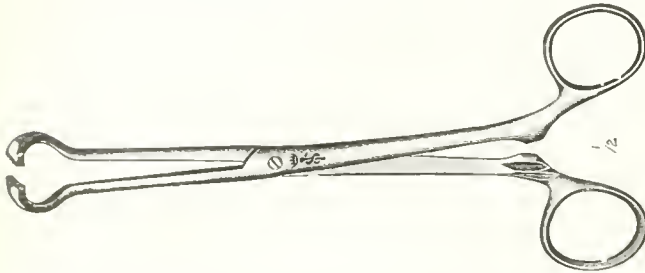
I believe that the movement toward specialization in surgery is an inevitable and normal movement. Surgery to-day is too large a field for one individual to master successfully. The solution of the present inadequate handling of the fracture problem is in my opinion the gradual development in each community of men particularly fitted and interested in the treatment of fractures to whom a large part of such work will be willingly delegated. These men should be general surgeons.—CHARLES L. SCUDDER in *The Ohio State Medical Journal*.

AN APPENDIX FORCEPS.

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Any instrument that will lessen the danger of infection and facilitate an operation, especially in laparotomies, may justly be regarded as worth while using.

The instrument here presented is a pair of forceps so modelled as to assist the surgeon in deliv-



ering an appendix, no matter how badly diseased, without crushing it.

The jaws of the forceps, as shown in the accompanying illustration are so shaped that they easily encircle the viscus without producing any pressure on it and grasp the mesappendix upon which traction can be made, to make it more accessible.

Of no less importance is the ease and safety with which the operator is enabled to deliver a diseased Fallopian tube.

PAPILLARY BLADDER TUMORS.

Here are two practical points that are quite trustworthy: the thicker the pedicle and the broader its point of attachment, the more likely is the growth to be not only clinically malignant, but histologically as well. And also the delicate, waving, fringe-like villi of benign papillomata are in marked contrast to the closely cropped, stunted villi of the papillary variety of cancer. Where a zone of brawniness is discernible at the point of attachment the growth is undoubtedly cancerous.—CLARENCE MARTIN, in *The Urologic and Cutaneous Review*.

GASTRIC ULCER AND HEMORRHAGE.

Hematemesis is of more frequent incidence than melena, wholly irrespective of the place occupied in the stomach wall by the peptic ulcer. It is interesting to observe, however, that melena *only* may occur with ulcers located on the lesser curve or pars media. In general, however, melena alone means that the ulcer is situated well toward the pylorus. On the other hand, hematemesis alone may occur with an ulcer located in any position.—FRANK SMITHIES, in *Interstate Medical Journal*.

BLOODLESS DESTRUCTION OF SURFACE CANCERS.

In cataphoresis some of the objections of the knife are overcome, but it is more or less a blind operation; this is its chief drawback. The electric current is a two-edged sword, and in inexperienced hands may do more harm than good. The zinc-mercury needles require great care and judgment in their use; the anatomy of the part must be understood that no harm be done vessels or nerves, and the strength of the current must be accurately regulated. In the hands of one expert in this line of treatment brilliant results are often seen; the current absolutely seals the tissues against the spread of the disease, while at the same time the virulence of the growth is destroyed. In superficial growths this method is nearly ideal, but in major operations the most careful manipulation is essential. One drawback is the extensive wound left to granulate and the (at times) extensive scar when the wound finally closes.

But there are patients who absolutely refuse the knife. Shall these be left to perish? Often they will accept electricity (zinc-mercury cataphoresis) or some other method less horrible to their mind than the knife. Much good can be accomplished, and in advanced cases the disease can be held in check and life prolonged as well as rendered bearable. X-ray, radium, and carbonic acid snow have had a long list of successes, and have a distinct and broad field of malignancy. Skill and judgment are necessary in their use, and their limitations are becoming more definitely ascertained.—CHRISTIAN LONGENECKER, in the *Pennsylvania Medical Journal*.

PRECANCEROUS BREAST CHANGES.

I am convinced that every carcinoma of the breast takes origin from a nidus of altered fibro-epithelial tissue, that there is an interval of time, sometimes weeks, often years, between the development of the primary benign lesion and its malignant transformation. In this interval, or in the very early stages of the malignant process, the stage when the cancer is not demonstrable clinically and often only in microscopic sections, in other words, when the disease is a purely local one, operation will cure, not the occasional case, but every case.—JOHN B. DEEVER, in the *Pennsylvania Medical Journal*.

Acidosis, from starvation or post-anesthetic, causes vomiting, and prolonged vomiting, by starvation, causes acidosis. With this association—acidosis and vomiting—it is important, and usually not difficult, to determine which is the cause and which the effect.

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WALTER M. BRICKNER, M.D., Editor

NEW YORK, OCTOBER, 1915.

BLOOD TRANSFUSION STILL FURTHER SIMPLIFIED.

In a previous editorial (the JOURNAL, April, 1915) we called attention to the advantages of a simplified method of transfusion by the use of citrated blood, as developed and successfully used by Richard Lewisohn of New York. We believe that our readers will be much interested in the article in this issue in which he describes another very simple and practical method of blood transfusion. In this method he merely withdraws the blood from the donor's vein (through canula and rubber tube) with a small syringe and promptly injects it therefrom into the recipient's vein, repeating the procedure with the same syringe as often as necessary until the desired amount of blood is transferred. This is certainly a great advance in simplicity over the Lindeman procedure, which requires a multiplicity of syringes, experienced assistants and much manipulation of the instruments.

The method here briefly noted by Lewisohn is, basically, the same as, and, indeed, it grew out of, that of Unger and that of Kush, in both of which, also, only one syringe for the blood is needed. It differs from them in that it obviates a special apparatus for shunting the blood current, manually (Unger) or automatically (Kush). Of all the transfusion methods thus far described this, the latest, is the most easily employed in any community since it requires, of surgical ap-

paratus, only a small (20 c.cm.) piston syringe and two canulae or large needles—a simple enough armamentarium to make transfusion applicable in almost any environment.

The method seems bold in its very simplicity. It is, indeed, almost harking back to the crude attempts of earlier generations; it does, apparently without danger, the very thing that it was thought impossible, for so simple a procedure to accomplish successfully; it carries us away from the much more complicated vessel-anastomosing and other devices that have been elaborated to avoid the dangers supposed to lurk in this crude, but now successful, mere aspiration and injection of blood, from vein into vein. And there was, indeed, a very real obstacle to, if not great danger in, this procedure, that lay in the clotting of the blood—an obstacle now quite overcome, it would seem, by Elsberg's little trick of continuously chilling the syringe with an ether spray from an ordinary hand atomizer!

This chilling of the syringe barrel is the essential factor that converts the impossible into the easily possible. It probably operates by preventing heat-expansion of the piston and, more especially, by reducing the viscosity of the blood and retarding coagulation.

This is, however, largely speculation. We must look to physical experiments to determine definitely how the chilling of the syringe makes possible the continuous play of the piston on the blood column. These experiments may well lead to other information that can be made use of in transfusion.

Whatever the way by which it is prevented, clotting is not seen in the transfer of blood with the single ether-chilled syringe; nor, apparently, does the slight reduction of the blood temperature do any harm. While no clot is seen, we must assume, however, that in this method, in the Lindeman method, and in the vessel-anastomosing procedures, small clots must, sometimes, find their way into the recipient's circulation.

This must happen, also, over and over again, as the result of traumata and of surgical operations. It is interesting to speculate on the immediate and the ultimate fate of small, aseptic clots in the venous and in the arterial systems. In the venous circulation how large must a clot be to cause damage? Are small aseptic clots *always* innocent when lodged in the lung or, perchance, under a heart valve?

Observations of syringe transfusions and of infusions have also demonstrated that even large

air bubbles passing into the veins do no harm—observations that remove much of our fear of the dreaded "air embolus." But are small air emboli *always* innocuous? Are large ones always dangerous?

In the fascinating study of blood transfusion we have by no means reached the last chapter. Nor—so many have been their modifications—can we say that the best and final method has been developed. But certainly the procedure is no longer (or need not be) the tedious, delicate and often disappointing operation that it once was. Especially, we think, the "citrate" method (which has certain obvious advantages) and the single chilled syringe method have removed blood transfusion from the function of the surgeon and specialist and placed it in the hands of all practitioners. These and other simplified methods should give an immense impetus to the more general employment of the transference of "the vital fluid" from those who can spare it well to those who may need it much.—W. M. B.

THE CURE OF VESICO-VAGINAL FISTULA.

Until the genius of Marion Sims rescued them from incurability women afflicted with a communication between bladder and vagina were hopeless as well as miserable creatures. Modern technique has much changed and improved the early rather cumbersome methods; and complicated special instruments and special suture materials have been discarded.

The successful treatment of vesico-vaginal fistula is based upon two cardinal principles: the utilization of all available material without the sacrifice of any healthy tissues, and the avoidance of all tension. If these two principles are adhered to special methods of suture, special suture materials, flaps, drainage, posture, etc., are of no importance. If tissues are not sacrificed, secondary operations after unsuccessful attempts are still feasible, and the difficulty of secondary operations is greater only in proportion to the increase of scar tissue.

Although the contrary opinion obtains, the bladder, much as every other hollow viscus, has a marked capacity for spontaneous repair, as is shown by the prompt closure of operative vesico-vaginal fistulae made for drainage in cases of intractable cystitis.

To cure a hole in the bladder it is absolutely essential to freshen its edges, most readily done by separating the vaginal mucosa from the bladder. The next step consists in mobilizing the bladder itself. If this mobilization, which may necessitate

extensive dissection, removal of the uterus or re-opening of the peritoneal cavity if the fistula is due to operative injury (radical hysterectomy, etc.), is successfully completed, a simple closure of the bladder wound is sufficient; in fact, with complete absence of tension and full mobility of the bladder suturing is not essential, because the displacement and retraction is sufficient, in most instances, to permit of healing if the urine is drained off by means of a retention catheter for a few days.—R. T. F.

Surgical Suggestions

The appearance of cancerous supra-clavicular lymph nodes after a breast amputation does not necessarily condemn the case as hopeless. The removal of these glands and active x-ray treatment may effect a cure even at this stage, or, at any rate, postpone for a long time the development of further trouble.

Great care and watchfulness are needed in the pre- and post-operative management of patients with cancer of the stomach and bowel. These individuals, even when apparently in fairly good condition, often collapse unexpectedly during or after operation.

Breast tumors, especially in the early stages, not seldom fail to present the classical signs by which their malignancy or non-malignancy may be determined clinically. In all cases where the diagnosis is doubtful, the tumor (or a piece of it) should be removed for microscopic study, before undertaking a radical operation.

Vomiting several days after gastro-enterostomy or other stomach operation is not necessarily an indication to continue the patient on rectal feeding or limited fluids. On the contrary, it may be an indication to give the patient more food, for it may be the vomiting of acidosis due to starvation. In such cases acetone can be detected in the urine and the breath.

In the treatment of acidosis alkalies (e.g., bicarbonate of soda) are helpful, but the administration of food, especially carbohydrates, is very important. Glucose feeding is very valuable both in the management and in the prophylaxis of acidosis, since a solution (5%-7%) can be readily administered by rectum or subcutaneously.

Surgical Sociology

Ira S. Wile, M. D., Department Editor.

MINOR SURGERY.

The term "minor surgery," according to the ordinary interpretation, comprises a varied assortment of surgical procedures for the relief and correction of fractures, lacerations, dislocations, burns and similar conditions. From the standpoint of frequency of use by the surgical profession, minor surgery forms really the major surgery of every day practice. In their social aspects or industrial and economic significance most of the surgical conditions classified as minor represent the most serious factors in the general accident problem.

According to the industrial experience of the Prudential Life Insurance Company of America, out of a total mortality of 33,790 from accidents among males from 1904 to 1913, 2,279 were due to burns, scalds, etc., 1,878 from fractures, while among women 3,377 and 1,233 respectively occurred among the 11,726 deaths from accidents. Drowning was responsible for the loss of 5,069 males and 772 females. This indicates a serious mortality from three conditions that one would find listed among minor accidents.

According to the bulletins of the New York State Department of Labor, the industrial accidents in the State from April, 1911, to March, 1913, as tabulated in Industrial Accidents, Bulletin of the United States Labor Statistics No. 157, were as follows:

Nature of Injury.	Number.	Per Cent.
Lacerations, cuts and bruises.....	98,038	67.4
Burns	9,451	6.5
Sprains or dislocations	6,359	4.4
Fractures	4,227	2.9
Suffocation, effect of heat, gas, etc....	418	.3
Multiple or other injuries	26,889	18.5
Grand total	145,382	100.0
Fatalities (included above)	1,017	.7
Complete severance or loss of member or part	3,602	2.5

The complete severance or loss of member or part refers to such results at the time of the accident and does not include such loss incident to subsequent operation.

It is obvious that in connection with problems of workmen's compensation, these minor injuries take on a greater significance. For illustration, the experience of the State of Massachusetts for the year ending June, 1913, indicated a wage loss from industrial accidents of approximately ten thousand dollars each working day. The average

amount paid for disability and medical attention was five thousand dollars each working day. The total number of fatal accidents was 474 for the year. 52.3 per cent. of the persons fatally injured were between the ages of 20 and 40 years, the period of greatest economic importance. The weekly wages of the majority of the fatally injured persons were little above the minimum necessary for family maintenance and left no provision for the dependent survivors. Only 12 per cent. of the 474 persons fatally injured earned over twenty dollars a week.

That fatalities of this kind are fraught with serious significance to the dependent family is strikingly evidenced by the conjugal state of persons killed in the industries of Illinois from July 1st, 1907, to December 31, 1912. In so far as facts are available 62.4 per cent. of the persons were married, while only 42.6 per cent. were reported as single. Similar, among those injured, but not fatally, of a total of 26,303, 57.9 per cent. were married and 42.1 per cent. single. It is needless to quote further to show that the stress and strain of accidents fall largely upon the families, which suffer either temporary or permanent restriction of income and consequent deterioration from lack of facilities to maintain the family above the line of economic independence. Permanent incapacity of formerly self-supporting workmen involves an added burden which can rarely be carried by the family itself and as a result society is bound to come to its relief. Under such circumstances, industrial accidents may be technically called minor but their results are of far reaching importance.

From the figures available for the State of Wisconsin, it is evident that many accidents that were accompanied by comparatively trivial injuries resulted more seriously, in consequence of infection which in all probability could have been prevented. The fact that 4.8 per cent. of the so-called minor accidents resulted in such infection bears solemn testimony to the importance of the early and correct treatment of all industrial accidents. That blindness should follow careless and dirty handling of an eye, injured by a foreign body, or that amputation should be the termination of laceration of the fingers, the hand, or the arm after alleged surgical treatment is a sad commentary upon the indifference, carelessness, or neglect of those called upon to give emergency treatment.

From the standpoint of practical usefulness, it is equally vital to be able to manage a burn so that deformity will not result or a lacerated wound so that it will not become infected, as it

is to be able to remove gall stones or perform a gastro-jejunostomy.

It is undoubtedly true, as suggested by W. Lipman in *The Modern Hospital*, that more time is allotted for the study of major operation in medical curricula than to the correct treatment of simple wounds involving repair of the tendons or nerves. It would not be fair, however, to blame the medical schools, because the principles of aseptic surgery that apply in the case of major operations also hold true for minor operations. Possibly the desire to perform more serious operations leads many practitioners to be more indifferent to simpler procedures, and in consequence some measure of carelessness results. This is an unfortunate state of affairs which will undoubtedly be corrected within very few years because of the new light that is dawning with relation to the value of conserving industrial workers. The practical financial side of the workmen's compensation act will in itself serve to promote a better type of "minor surgery" than has been practiced on the victims of industrial accidents.

A BULLETIN ON ACCIDENT PREVENTION.

The Health Bulletins issued by the State of Virginia have attracted considerable attention because of their originality and pointedness. Again, the value of initiative has been manifest in the August number. The Department of Public Instruction in conjunction with the State Board of Health has compiled and presented to the citizens of Virginia a twenty-one page pamphlet dealing with First Aid to the Injured and the Prevention of Accidents.

In March, 1914, the General Assembly of Virginia enacted "that it shall be the duty of each teacher in the public schools of the Commonwealth to devote not less than thirty minutes in each month of the school session for the purpose of instructing the pupils therein as to ways and means of proper observation so as to prevent accidents." The superintendent of the Public Instruction was directed to prepare, publish and distribute adequate information for the guidance of the teachers.

The manual that has been issued contains a brief but satisfactory exposition of the facts necessary for ordinary instruction in schools. If the pupils are thoroughly familiar with the subject matter thus made available for presentation to them, they will be well prepared to enter into industrial life and serve as foci of education for those whose instruction along the line of accident prevention has been less favorable.

Book Reviews

Diarrheal, Inflammatory, Obstructive, and Parasitic Diseases of the Gastro-Intestinal Tract. By SAMUEL GOODWIN GANT, M.D., LL.D., Professor of Diseases of the Colon and Rectum, N. Y. Post-Graduate Medical School. Octavo; 604 pages; 181 illustrations. Philadelphia: W. B. SAUNDERS COMPANY, 1915. \$6.00 net.

This is a very thorough and competent treatise, devoted to diarrheal diseases of all kinds. The subject is taken up in all its many varieties. In several chapters the author has discussed thoroughly diarrhea due to organic diseases other than those of the intestinal tract. Diarrhea as a symptom in acute infectious and contagious diseases is also dealt with. The chapters devoted to diarrhea as a symptom of tropical diseases such as Cochín-China diarrhea, sprue, hill diarrhea, etc., are most instructive and interesting, especially in view of the infrequent appearance of these topics in our general literature. The main value of the book consists in the author's systematic and thorough review of the facts and literature pertaining to tuberculous, syphilitic, entamebic, and bacillary colitis. The treatment of these topics is exhaustive. The pathology is particularly well described.

The discussion of treatment, while occasionally monotonous because of the necessity for repetition, is nevertheless thorough. The author's personal viewpoint in regard to surgical procedures in chronic diarrheal diseases is repeatedly thrust upon us, often apparently to the displacement of more conservative medical means. Many interesting chapters are written on types of diarrhea rarely met with in the course of routine observation, such as helminthic, protozoal, gonorrheal colitis, etc. Those chapters devoted to surgical treatment, technic of examinations and technic of operations are minute in their detailed instructions and in their patient description of technical procedures.

All in all, the book is a valuable addition to medical literature, valuable in that it is a thoroughly exhaustive, accurate and painstaking account of the one symptom, diarrhea, as it occurs in any of its protean manifestations as a symptom of medical or surgical disease. The literary references, while abundant, are not too profuse to interfere with the text. The author's viewpoint is apparent throughout; his personality is evident at all times.

The book is well arranged, the type clear, the paper good, the illustrations profuse and well reproduced.

Cancer: Its Study and Prevention. By HOWARD CANNING TAYLOR, M.D., Professor of Clinical Gynecology, Columbia University, N. Y. Duodecimo; 332 pages. New York and Philadelphia: LEA & FEBIGER, 1915.

This little volume satisfies a distinct demand on the part of the medical profession. To have assembled within a comparatively small space practically all the essential data on the subject of cancer is a work for which readers will be thankful. Not of the least importance is the chapter dealing with the general considerations of the cause, predisposition, and geographical distribution of cancer. A good deal of the obscurity of hearsay and traditional knowledge of cancer has been replaced by scientific facts as accumulated in the past decade. A still more important chapter is the one dealing with precancerous lesions in all anatomical regions. This, it would seem, should be equivalent to a chapter on the *prophylaxis* of cancer as far as it is possible in the present day knowledge of this disease to speak of cancer prevention.

A Manual of Gynecology for Students and Practitioners. By SAMUEL J. CAMERON, Assistant to Regius Professor of Midwifery, University of Glasgow. Octavo; 552 pages; 206 illustrations. London and New York: LONGMANS, GREEN & Co., 1915.

We are glad to have read this book, not because it presents the most recent developments in gynecology, and closely allied subjects, nor because it presents in a new

and original way a subject that has been written up by many other celebrities, but because this work reflects the clinical conception and practice of gynecology of the Glasgow School. As a report of the practice and methods of this school, the present volume can be welcomed by gynecologists. As a modern book on the subject, however, it can hardly be recommended to students and practitioners. A great deal of the medical contributions to the chapter of ductless gland physiology about which, it is true, there is still variance of opinion, and more especially about the relation between ovarian function and menstruation, and other essentially fundamental principles that have recently been pretty well established, have all been purposely omitted by Cameron. It may be a convenient way to dismiss these perplexing subjects with the simple assertion that opinions concerning them are neither uniform nor fixed, but these are subjects of vital interest to all students at the present time.

Progressive Medicine. Edited by HOBART AMORY HARE, M.D., June, 1915. Philadelphia and New York: LEA & FEBIGER.

The volume contains, as previously, chapters on hernia, surgery of the abdomen, gynecology, diseases of the blood—diathetic and metabolic—diseases of the thyroid gland, spleen nutrition, and the lymphatic system, and a final chapter on ophthalmology. The reviews by the collaborators of the former volumes embrace essentially the progress of measure in the past year in all of the subjects enumerated.

The Intervertebral Foramina in Man. By HAROLD SWANBERG. Member American Association for the Advancement of Sciences. With an Introductory Note by PROF. HARRIS E. SAUTEE. Crown octavo; 95 pages; 11 original full-page plates. *Chicago Scientific Publishing Co.*, 1915. Price, cloth, \$1.75.

This small but valuable work is a supplement to the author's "The Intervertebral Foramen," a monograph noted and described in a previous issue of the JOURNAL, which presented an accurate histological description with photomicrographs of the intervertebral foramen of the cat. From this work the author was led to study the foramina in man where all the foramina have a similar structure though no two are identical. This new volume is, therefore, a study in the morphology of the intervertebral foramina in man including a description of their contents and adjacent parts with special reference to the nervous structures.

The work presents definite facts (and no conjectures) established by painstaking research. The text deals with (1) a general description of the intervertebral foramina and their contents, (2) a detailed description of one particular foramen and its adjacent parts, with photomicrographs, (3) a summary based upon careful examinations of numerous foramina, and their surrounding tissues.

A Synopsis of Medical Treatment. By GEORGE CHEEVER SHATTUCK, M.D., Assistant Physician to the Massachusetts General Hospital. *Second Edition*, revised and enlarged. Duodecimo; 185 pages. Boston: W. M. LEONARD, 1915.

Though small enough to be easily carried in one's pocket, this book will be found to contain a very large amount of information of use in the medical treatment of various diseases. The book was primarily written for use in Harvard Medical School, but it will be found of considerable value to the general practitioner, since by the simplicity of its arrangement information on any point can be very quickly obtained.

The International Medical Annual: A Year Book of Treatment and Practitioners Index. *Thirty-third Year.* Octavo; 760 pages; illustrated. New York: WILLIAM WOOD & Co., 1915. Price, \$4.00.

The International Medical Annual continues to maintain its high plane of excellence. The volume is larger than the previous year's and this is especially noteworthy since it was compiled during the time that England was at war, and almost all the contributors are British. The

general arrangement of this volume is similar to the previous numbers excepting that this year there are special departments devoted to naval and military surgery.

Not only the great variety of sources drawn upon, as shown by the references, but the complete index, the excellent typography and above all the splendid illustrations both plain and colored serve to make this Annual an extremely valuable asset to the practitioner's references.

Collected Papers from the Research Laboratory of Parke Davis and Co. Detroit, Mich. DR. E. M. HOUGHTON, Director, Reprints—Volume 3, 1915. 341 pages.

As stated in the title this volume contains reprints of articles, twenty-one in number, which have appeared in various medical publications during the past year. The subjects of these papers cover a variety of fields,—bacteriology, immunology, hematology and dentistry, and go to show what a large variety of subjects have to be investigated in the conduct of a modern scientific pharmaceutical business.

Progress in Surgery

A Résumé of Recent Literature.

Malignant Diseases of the Large Intestine. A Plea for Early Diagnosis and Early Radical Operation. H. BEECKMAN DELATOUR, Brooklyn. *Journal of the American Medical Association*, August 28, 1915.

Delatour says that we cannot educate the public to recognize the onset of cancer of the large intestine as we can for the superficial growths and must depend on the general practitioner, who must be impressed with its importance. The symptoms are unfortunately not very definite and many patients are brought to the hospitals for emergency operations for intestinal obstruction, whereas the real cause is a tumor that has been growing for months or even years. Dependence cannot be placed on any special symptom or symptoms; the whole case must be gone over. The patient is rarely under 35, but is usually over 50, and one of the most constant symptoms is constipation, usually obstinate, accompanied by flatulence. Diarrhea frequently alternates with constipation. Pain is usually intermittent and is felt most at the site of the obstruction, which comes on so gradually that frequently it is complete before it is suspected. It may be precipitated by the lodgement of food. Symptoms of intestinal toxemia are nearly always present and not easily met. Cachexia usually appears when the disease is well advanced. Vomiting usually does not appear till obstruction has developed and blood and mucus in the stools are valuable signs, but are seen only when the growth is in the rectum or lower sigmoid. Blood analysis is of some aid in the diagnosis, the leukocyte count is higher than normal when obstruction occurs and may be 20,000 to 25,000 when the obstruction is nearly complete, while the polymorphonuclear count may not be above 65 or 70 per cent. The carcinoma skin reaction as proposed by Elsberg, Neuhof and Giest and studied later by Lissner and Bloomfield, is said to give a positive reaction in 70 to 80 per cent. of cancerous cases and only 8 per cent. of noncancerous. Abderhalden's ferment diagnosis may be of service, and exaggerated peristaltic action of the bowel, when it can be observed, is a positive sign of stricture. Absence of palpable tumor is not a negative sign. The roentgenographic indications are noticed; they may be of value even in the early stages. After removal, Delatour thinks the prognosis of bowel cancer is better than that of other internal cancers owing to the less liability to metastasis. It is worse the nearer the growth is to the anal opening on account of the early infection of the inguinal glands. Treatment is surgical and consists of extirpation of the growth and adjacent lymphatic glands after clearing out the bowel. Sometimes this can be done by lavage, but when the obstruction and distension are extreme and immediate relief demanded, a colotomy should be performed on the proximal side and then after a few days of thorough drainage, combine with irrigation of the lower

bowel, the operation for radical removal may be performed. The special points to be noted in regard to operation, the arterial supply, etc., are mentioned. With regard to operating for rectal cancer the author states his preference for the combined abdominal and perineal routes, preferably done in two stages. His object in offering this communication is to impress on the general practitioner the need of thoroughly investigating cases of obstinate constipation and intestinal indigestion with symptoms of toxemia, especially in patients over 35 or 40 years of age; to not regard bleeding from the anus as caused by piles without investigation; to not neglect examination of the rectum with finger and speculum; and finally to urge the bringing of these patients to operation as early as possible.

Chronic Intestinal Stasis with Infection from a Surgical Point of View. W. B. RUSS, San Antonio, Texas. *Journal of the American Medical Association*, August 28, 1915.

Russ dwells on the importance of studying the cases and learning whether prior to the existing disability the patient was a comparatively normal individual, which is rarely the case, instead of a neurotic subject with physical and especially nervous abnormalities. In spite of such abnormalities the colon and terminal ileum may within reasonable limits meet the individual's needs, as is shown by the long lives of most visceroprotic individuals. It is only when the walls of the colon or ileum have become infected that the individual suffers ill effects, and even then the health need not be seriously broken unless the local immunizing mechanism of the bowel wall is overcome and the protecting influences of the other bodily defenses have been impaired. Many of the patients, however, reach a point where they can only be relieved by surgical measures, and the ideal operation will be one that will secure easy and complete emptying of the bowel, thus relieving the toxemia; it must relieve the back pressure and reflux into the ileum, provide a means for the treatment of infection, cure the chronic appendicitis, and at the time avoid any unnecessary mutilation that will destroy future functional usefulness of the organs. In his practice he has used the following method, which seems to meet the needs of the case: Through a long right rectus incision, the entire colon and terminal ileum are carefully freed from adhesions or bands threatening obstruction. The cecocolon is plated down to normal by Blake's method, and the appendix, if possible, with a tentlike portion of the cecum, is drawn up into a large stab wound, placed so as to fix the cecum in the abdominal wall. The parietal peritoneum is dissected back from the margin of the stab wound to insure a firm fixation. The base of the appendix being well up in the wall, it is possible to dilate the lumen until it will admit a large catheter, through which the bowel can be flushed and the remaining fluid siphoned off. This procedure removes obstruction, replaces the cecocolon, and reduces its size, fixes it in position, and provides a means for relieving back pressure on the atonic bowel and provides a means for fighting infection, besides disposing of the diseased appendix.

Benign Lesions of the Stomach and Duodenum. The Choice of Surgical Procedure with Special Reference to Late Results. CHARLES H. PECK, New York. *Journal of the American Medical Association*, August 21, 1915.

Peck reviews the methods that have been used in gastric and duodenal ulcers during the last few years. Gastro-enterostomy is still the operation of choice, with or without some form of pyloric exclusion, and he takes up the question as to whether the late results justify the choice. The two theories of its beneficial action most commonly advanced are drainage and chemical effect. The clinical results in most uncomplicated cases have been satisfactory. The question whether or not the patency of the opening will be permanent in the human subject as it has been in animal experimentation, if the pylorus is left unclosed, is taken up and Peck has collected a large number of roentgenograms of the condition which seem to prove that such is the case. This would seem to support the drainage theory. One hundred and thirty-four patients with gastric

and duodenal ulcer have been operated on at the Roosevelt Hospital since January 3, 1910. Seventy-four of these cases were chronic duodenal ulcer and thirty-four chronic gastric ulcer. The remaining cases were more or less complicated, such as ulcer with hour-glass contraction, perforations, etc. The operative procedures were simple gastro-enterostomy for seventy-two of the seventy-four cases of chronic duodenal ulcer, thirteen of the thirty-four gastric ulcer, twelve duodenal ulcers with perforation, and four similar gastric cases, and one case out of six of hour-glass stomach. Six patients with the chronic duodenal ulcer died after operation and two died subsequently, too soon to estimate operative results. Of the sixty-five remaining cases all but seven have been followed up and of these nearly seventy per cent. are cured, and eighty-eight per cent. have good results, and only twelve per cent. poor results. He compares these with Küttner's figures and concludes that for chronic duodenal ulcer simple gastro-enterostomy is a safe procedure, and there is no evidence that pyloric exclusion would give better results, hence the drainage is an important factor in maintaining the cure. In the gastric ulcers the results were not so good, but the series is too short and many of the cases too recent to allow any absolute conclusions. The mortality was considerably higher but the patients were in poor condition as a rule and at least one of the cases as shown by the necropsy should have been considered inoperable. In seventeen cases the patients are well and relieved of symptoms, though five were operated on too recently to be classed as permanently cured. As regards the treatment of chronic gastric ulcer Peck thinks that Rodman's operation of pylorotomy is the ideal one when the ulcer is near the pylorus. When on the lesser curvature in the pyloric or middle third, cauterization, with or without gastric enterostomy and some method of excision of ulcer rather than simple gastro-enterostomy. In seventeen cases of acute perforated duodenal ulcer there were two deaths. Primary gastro-enterostomy was performed in twelve of the cases. Seven patients are cured, five are improved and one is untraced. Of the cured patients five had gastro-enterostomy, which seems to be the proper operation in selected cases. The mortality in the acute perforated gastric ulcer cases was six out of thirteen cases, all more or less complicated. In this condition the choice of procedure is governed by the chances of drainage, cleansing the peritoneal cavity, and considering whether a gastro-enterostomy should be performed. In all the late Roentgen examinations after simple gastro-enterostomy the pylorus was open and the review justifies the conclusion that this will be the case in at least a large percentage of cases. A functioning stoma is usually accompanied with clinical cure of ulcer symptoms, though it may be narrowed.

Subinfection from Foci in the Pelvis and Abdomen.

HORACE G. WETHERILL, Denver. *Journal of the American Medical Association*, August 21, 1915.

H. G. Wetherill discusses the subject of chronic infections from local foci in the abdomen which he thinks have failed to receive the attention their importance merits. He criticizes Lane's theory of colon intoxication and his recommendation of the complete extirpation of the large intestine as hazardous and not supported by uncontrovertible facts. The acceptance of his theory involves the admission of the permeability of the normal colon by a pathogenic organism, a theory which would appear to have been clearly disproved by Neisser. Their entrance into the circulation through damaged tissues, however, is a well-known fact to every gynecologist and abdominal surgeon, and they form foci which may become encapsulated by a quarantine fibrosis of adjacent tissues. During this process, however, the germs may be taken up by the blood and lymph channels and form foci in other portions of the body. Billings enumerates the common systematic results of such focal infection as chronic arthritis, one of the most common, nephritis, both acute and chronic, cardiovascular degeneration, chronic neuritis and myalgia. He cites among other local foci gastro-intestinal ulcers, chronic appendicitis, cholecystitis and cholangitis, and the genitourinary tract. Chronic catarrhal appendicitis may not only cause its local disturbances, including digestive disorders, but may be the source of damage to the cardiovascular apparatus. Wether-

ill quotes the history of such a case of cardiac complications from Dr. Bonney, published in his work on pulmonary tuberculosis, and on which he himself operated with brilliant success in the cure of the general as well as the local condition. It is probable that many of the pathologic processes, which we call metastases, are similar in their origin, a conveyance by the blood of the pathogenic bacteria with their arrest and activity at distant points. Wetherill refers to Rosenow's suggestive work as supporting this view. Some recent experiments of his appear to prove that an abdominal disorder like appendicitis is often the result of a secondary hematogenous infection from the tonsil, and Wetherill sees no reason why such a secondary focus in the appendix may not in turn be the starting point for extensive systemic disease. Lubarsch's recent studies show that germs can lie latent for long periods until trauma or inflammatory hyperemia enable them to produce a typical disease, and latent foci in the abdomen are not to be disregarded. A broader and more comprehensive study of the cases is needed, more thorough and complete physical examination, careful blood studies and cultures are required, the cooperation of the laboratory and of other clinicians, and while the secondary focus is eliminated, the primary one must be also sought for and destroyed if found.

Intestinal Obstruction. ALEXIS MCGLANNAN, Baltimore, *Journal of the American Medical Association*, August 21, 1915.

A. McGlannan says that though aseptic surgery has revolutionized the mortality statistics of acute intra-abdominal disease, the death rate from intestinal obstruction remains almost as high as it was thirty years ago. In the series of 276 cases studied by him the mortality was 45.7 per cent. In 161 cases the obstruction occurred in the small intestine, and 46.6 per cent. died. Seventy-five were cases of large intestine obstruction, and the mortality was 44 per cent. In forty-nine cases the exact position of the obstruction was not given, though probably in the small intestine. In the jejunum the obstruction was fatal in 52 per cent. of the cases. Much experimental work has been done to determine the cause of death, and it indicates that the secretion of the duodenal mucous membrane is involved in the fatal factor. Hartwell and Hoguet, in their experiment, show that dehydration is an important element in a fatal outcome. In pathologic obstruction of the human intestine met in clinical work an intact mucous membrane is never seen. Earlier effect is shown in the altered nutrition of the bowel caused by interference with the circulation. The slow onset of toxemia and its slight degree in chronic obstruction may be due to the development of a resistant epithelium with a compensatory hypertrophy, occurring in the loop of bowel above the obstruction; or it may be the result of the gradual development of a vicarious function of resistance by another organ. From the work so far done, McGlannan points out that the toxemia arises from the duodenal secretion, and says all facts point to the absorption of a chemical compound of the cholin group of substances as the underlying essential cause of death in intestinal obstruction. The causes of death in the present series in the fatal cases were: toxemia, 75 per cent.; peritonitis, 12 per cent.; postoperative shock, 5 per cent.; miscellaneous, 8 per cent. In these 127 cases there were twenty in which the bowels were gangrenous. Fourteen of these patients died of toxemia, three of peritonitis, and three others, fifteen, twenty-nine and twenty-six days, respectively, after operation, from pneumonia, tuberculosis and embolism. The toxemia is combated with great difficulty. Its immediate effects on the heart and vasomotor system, and the secondary effects on the kidneys, liver, and other important organs tend to disaster. Early recognition and prompt treatment offer the only hope of reducing mortality. In the present series of cases the average duration of symptoms before operation in the cured jejunal obstruction was one and two-thirds days. In the fatal jejunal cases two and five-sixths days, in the ileum cases the average duration of the cured was three and one-third days, of the fatal, six days. As a rule, the higher the obstruction, the more fatal the outcome. He describes the symptoms of the three stages, which at the onset are pain, nausea and vomiting with or without constipation or

diarrhea coming on suddenly without regard to ingestion of food. Movements of the bowels or stomach washing will not relieve the pain, and with these symptoms the diagnosis should be promptly made and the operation performed. If there is any hesitation a second lavage should be done after one hour. The presence of duodenal material in the washings at this time makes a diagnosis certain. In eighteen cases of operation made on these symptoms the obstruction was found and the patient recovered. In the second stage we have persistent pain, distention, a visible and palpable spastic coil of intestine, visible peristalsis, with ladder pattern, local tenderness, etc. Frequently, gangrene of the bowel and localized peritonitis. In the third stage toxemia overshadows everything, and is the principal object in treatment. Sixty-three of the 276 cases were postoperative and twenty of the patients died. Nearly 40 per cent. of these followed drainage after operation for appendicitis, which is a potent argument for early operation in those conditions when no drainage will be required. Operative methods vary with the stage of the disease, its complication, etc. In the third stage, enterostomy will be the only method justified. When toxemia has developed it must be combated regardless of what must be done for the direct relief of the obstruction. After the enterostomy a large quantity of water should be supplied, best by hypodermoclysis, to prevent dehydration, and third, the injection of epinephrin intravenously or with the subcutaneous water to counteract the effect of the toxin on the heart and blood pressure.

Surgical Considerations of Splenectomy. WILLIAM J. MAYO, Rochester, Minnesota. *Annals of Surgery*, August, 1915.

Mayo states that the safety of splenectomy depends upon a careful separation of the splenic attachments and upon delivering the spleen without injury to the vascular pedicle. He employs a Beyer incision—the spleen is then freed from its surrounding adhesions with the finger; at the upper pole especially the adhesions are very vascular and require guarded manipulation. The blood vessels in the adhesions cannot be seen or controlled until the spleen is mobilized from its bed and drawn down; it is, therefore, best to free the spleen by the finger, bluntly, and to control hemorrhage with a large gauze packing. Where adhesions must be divided sharply, this is best accompanied by dividing them close to the capsule of the spleen and by delivering the organ by a combination of enucleation and division. The most serious vascular attachments that require attention are the vasa brevia in the gastro-splenic ligament. Most of these attachments can be delivered with the spleen when the stomach is drawn from the abdomen. The lienorenal ligament possesses little vascularity and can readily be divided. The spleen may now be lifted up, presenting a vascular pedicle for treatment.

(On several occasions Mayo ablated a portion of the pancreas while removing the spleen. No serious symptoms ensued. In two instances part of the stomach wall was injured.)

The vascular pedicle should be tied by securing the artery first, the other vessels subsequently. A very short pedicle is secured by the two-forceps method—the forceps are placed three-fourths of an inch apart on the pedicle, the spleen ablated and the proximal and finally the distal forceps ligated with cat gut.

As a last procedure, and an exceedingly important one, Mayo sutures the margins of the "raw space," closing it, as well as possible, thus avoiding practically all likelihood of hemorrhage.

The Treatment of Malignant Disease by X-Rays. J. A. CODD. *The British Medical Journal*, May 15, 1915.

In this article the author pleads for more frequent use of the x-rays especially in the post-operative treatment of cancer cases. He thinks that at the present time we have nothing to equal x-rays and radium in their effect on neoplastic tissues. He believes that after the removal of a new growth the open wound ought to be exposed to the rays in spite of the added danger of causing infection. As a rule too much time is lost before recourse is had to the x-rays. Codd uses the Coolidge tube which is by

far the most effective of the various x-ray tubes. The cases that have yielded best results have been those of rodent ulcer. Large superficial epitheliomata have also quickly healed under x-raying.

Radiotherapy in Cancer of the Uterus. A. MARTIN, Berlin, *Jahreskurse für ärztliche Fortbildung*, July, 1915.

Martin reviews the literature of the past year with special reference to radiotherapy. Only the effect of the radio-active substances upon the histological structure of carcinoma and the clinical manifestations will be here summarized.

The influence of the radioactive substances on the histologic structure of tumors is the same, no matter what form of radio-energy is employed; thus the studies of Aschoff with x-ray, Haendly and Weinbrenner with mesothorium, Doderlein with mesothorium and x-ray; Exner, Wikham, DeGrafs, and Bellot with radium, have all shown practically the same effect on the tumor cells. In general, the formula suggested by Bergonnié and Tribondeau for the sensitiveness of cells to rays has been verified by the other investigators. Thus it has been shown, that the cells are the more sensitive to the ray: 1, the greater their reproductive activity; 2, the longer their karyokinetic phase, that is, the more remote they are from their mature state; 3, the less defined their morphology and formation.

Von Hansemann and Schottlaender have shown that there is nothing specific in the effect of the ray on the histologic picture. The pictures often show changes frequently seen in rapidly growing or rapidly disintegrating tumors, but this can be seen only by examining pieces for diagnosis and comparing them to the extirpated tumor or to excised particles which latter show these pictures. The effect on normal tissues is practically the same as on pathological tissues; at first, there is hypertrophy; then necrosis of cells and bacteria; followed by absorption; then replacement by scar tissue. This is the same in both animals and plants, as well as in human and animal tumors (Keyserling). These changes are induced by the so-called irritation doses (Reizdosen). Sachs warns against these milder doses because they may stir up to greater activity the deeper-lying carcinoma cells instead of being inhibited in their growth and even destroyed, as are the more superficial lying cells;—they may even take on an increased activity. Von Franqué has demonstrated this in a convincing way: All rays decrease in effect in proportion to the square of the distance from the ray-source. Certain amounts of the ray are absorbed by the exposed tissues; of the x-ray, of mesothorium, of radium, 40%; of the roentgen-ray, 30%, for one centimeter of tissue layer (Keetman). The limit of the penetrating effect of the ray does not seem to exceed ten centimeters. Part of the residual x-ray may penetrate still further; according to Lazarus, as much as a meter in depth.

A selective effect, in the sense that only carcinoma cells are destroyed, has not been demonstrated for any kind of ray. There is, however, a certain tendency of the ray to destroy carcinoma cells—to replace connective tissue by stimulating increased activity. Upon normal epithelial cells, there was practically no effect. If the ray intensity is not sufficient, the carcinoma may even be stimulated to greater, more active proliferation, which sometimes becomes very intense. If the ray intensity is excessive, the neighboring tissues may also be destroyed. Aschoff, Kroeing and Gauss have reported necrosis due to burning of the intercostal muscles in a case of mammary carcinoma, of the superficial layers of lung and of small areas of liver (found at autopsy). Possibly, this will not occur with the employment of the newest apparatus. Bumm, however, says this danger has been practically eliminated.

Clinical manifestations.—Frequently there is noticed a swelling and hyperemia (inflammatory signs) of the tumor. Secretion is increased; suppuration and hemorrhage decrease, in fact cease altogether; the secretion becomes odorless and serous. This also disappears in a few weeks, occasionally more rapidly, at times more slowly. The proliferation gives way to shrinking. The ulcerated mass becomes epidermalized. The vaginal portion takes on a normal form. Sloughing is evidence of excessive dosage. By and by the vaginal vault becomes narrower, the vaginal portion disappears, giving the impression of senile atrophy

of the genitals. Infiltrated parametria begin to show hard indurations. Pains disappear with surprising rapidity. Amenorrhea and shrinking of the ovaries result. *The ova cells are more noticeably sensitive to the ray than carcinoma cells.*

This local change is, as a rule, accompanied by a remarkably rapid improvement in the general condition. Cachexia and anemia disappear; the body weight increases under better nutritional activity; general efficiency and capacity for work return.

In another series of observations the opposite condition obtained, whether with smaller or larger doses, lassitude, weakening, febrile state, nausea, vomiting, anemia, due to the direct effect of the ray on the red blood cells.

Kolde and Martens observed when large doses were used, a decrease of one million to the cubic millimeter with diminution in hemoglobin and erythrocytes (Schantz). This is probably due to absorption of toxic proteid-by-products from the affected carcinoma which may have a jeopardizing effect on life.

The bladder is often badly affected—ardor urinae is ushered in, enuresis also; mucous discharge and tenesmus are frequently observed. These disappear when small or moderate doses are used. *These untoward symptoms have been obviated by improved technic.* Stricture of the rectum which necessitates artificial anus, recto-vaginal fistula (two cases of Bumm's reported at the Halle Congress died of urinary infiltration following bladder necrosis and suppuration. Heynemann showed cystoscopically that in more than two-thirds of all the cases there was bulbous edema of the bladder walls and the ureter orifice. In two cases there was extension of the carcinoma upon the bladder wall. The danger of stricture should be borne in mind. Bucky reported an autopsy of a case 5 months after intensive raying. There were ulcers on the buttocks several centimeters deep, also over the mons veneris. At the same time an extensive cervix carcinoma had broken through into the bladder. Halban reports a fatal hemorrhage from an erosion of the hypogastric vein 27 days after inserting 27 mg. of radium into a recurrent tumor of the parametrium. But the filter capsule instead of being of lead should be of brass. This retains only 3% of the secondary rays, which retention is almost negligible.

Cheron-Rubens-Duval use platinum and gauze surrounding it (30 layers of gauze). There is no question that a large part of the injury is due to imperfect apparatus. These are avoided by improved technic. We know today that the lead filter gives off secondary rays which are identical with the soft beta ray, and has a corrosive destructive effect. Brass obviates this almost totally.

(To be continued.)

Fatal Post-Operative Pulmonary Hemorrhage. EMIL NOVAK, Baltimore. *Interstate Medical Journal*, June, 1915.

Novak calls attention to the occurrence of pulmonary embolism, though its nearly always present danger is considered negligible. He cites a distressing case in his own experience where his patient died on the sixteenth post-operative day during an apparent normal convalescence.

He cautions against the present tendency to set patients out of bed at an inordinately early period after operation. Here there is particular danger because thrombosis not infrequently occurs in the iliac vein and may, therefore, be unnoticed. He emphasizes the value of handling tissues at operations gently to avoid causing tiny blood clots by bruising and forcible and unnecessary retracting of wound. Finally, the surgeon's asepsis should be beyond criticism.

The Clinical Value of the Complement Fixation Test in Surgical Tuberculosis. HENRY KELLER and A. J. MORAVEK, New York. *The International Journal of Surgery*, July, 1915.

These authors used cultures of tubercle bacilli or alcoholic extracts of tuberculous liver for antigen in their complement fixation work. They examined sera from a series of surgical tuberculosis cases. Their conclusions may be summarized as follows:

1. Normal individuals will give a negative complement fixation test even if they have a small healed tuberculous lesion.

2. In the presence of active disease the fixation test is present in 76 per cent. of cases.

3. By means of the fixation test it is possible to determine whether the type of infection is human or bovine.

4. The test is negative before there is an appreciable surgical tuberculosis lesion.

The Treatment of Tubercular Cystitis by Injection of Lactic Acid Bacilli. (*Traitement des cystites tuberculeuses par les injections de bacilles lactiques.*) MARION, Paris. *Bulletins et Mémoires de la Société de Chirurgie de Paris*, May 26, 1914.

It is well known that some cases of tuberculous cystitis will not heal even when the primary lesion is removed; for these cases Marion proposed injections of lactic acid bacilli into the bladder since the favorable action of lactic acid on tuberculous laryngitis and glossitis was established.

He injected 10 to 15 c.c. of a pure culture of lactic acid bacilli obtained from the Pasteur Institute and allowed to remain at 37° C. for twelve hours before use. The treatment was repeated three times a week.

The results of treatment varied. Some patients had immediate relief with abatement of vesical symptoms; in others there was developed increased pain and a distressing sensation of "warmth" in the bladder. The variance in results Marion attributes to the variation of lactic acid concentration in the different tubes of lactic acid bacilli employed.

Arthroplasty of the Elbow. ASTLEY PASTON COOPER ASHHURST, Philadelphia. *Annals of Surgery*, September, 1915.

Ashhurst adopted arthroplasty of the elbow joint in five patients; twice for bony ankylosis and three times for limitation of motion following fracture.

He makes his skin incision along the external condyle for about 10 c.m. downwards. The muscles are displaced and the external condyle is exposed thoroughly with the anterior capsule of the joint. With an osteotome the external condyle is detached from the humerus. If ankylosis is present between the radius and the humerus it is easy to separate them by a gouge, without injuring the external lateral ligament. The external condyle is now turned downward and the joint exposed.

In shaping the bone ends the ulna is spared as much as possible. The bone ends having been shaped properly and restored to their normal relations—the original skin incision is prolonged so as to expose the triceps and to make a triangular skin flap which will include subcutaneous fat. An interposing flap is now raised from the superficial surface of the triceps with its base at the olecranon. The elbow is again partially dislocated and this interposing flap attached to the internal lateral ligament of the elbow and to the anterior and posterior capsules of the joint. The elbow joint is once more reduced to normal position and the downward turned external condyle fixed to the humerus in front of the interposing flap. The author uses Lambottis self-boring screws to accomplish this. The triceps is sutured accurately to the brachioradialis and extensor muscles, the fascia sutured carefully, and the skin closed.

With this operation Ashhurst obtained gratifying improvements in all five cases operated.

End Results of Bone Fractures. (Report of the Committee of the American Surgical Association.) W. L. ESTES, Chairman. *Annals of Surgery*, September, 1915.

The committee confined its investigations to fractures of long bones. It urged the following recommendations:

1. Fractures should be treated by a skilled surgeon.

2. The x-ray should be employed before the permanent dressing is applied; at least two skiagrams should be taken and from opposite perpendicular directions. Radiograms should be taken also after reduction is accomplished.

3. Fractures should be reduced immediately after injury if appliances are at hand for a permanent dressing.

4. Unless there is some contra indication general anesthesia is to be used during reduction.

5. Generally speaking, non-operative methods are especially effectual during age period under 15 years; above 60 years of age operative measures may be carried out with confidence if non-operative treatment has been without avail. Operation should not be delayed beyond one week after injury.

6. If the open method is adopted it should be done early.

7. Some type of rigid plate applied directly to the bone or an Albee "inlay" seems to be the best fixation method in operative cases.

8. Open operations for simple fractures require proper and careful instruments in the hands of thoroughly trained surgeons.

The Use of Magnetism for Localizing Needles in the Tissues; with the report of cases. G. H. MONKS, Boston. *Boston Medical and Surgical Journal*, July 8, 1915.

Monks describes a technic for localizing needles in tissues, which in certain cases he deems valuable. The essential steps are, briefly, the following: After noting the position of the needle by the x-ray, an ordinary steel magnet, or better, an electro-magnet is so placed over the affected area that the needle is between the two poles of the magnet. This magnetizes the needle. A sterile, magnetized needle is then suspended by a thread at its middle and permitted to approach the site of the buried needle. Naturally the opposite poles will attract, while the similar poles repel. This definitely indicates the position of the ends of the buried needle. A longitudinal incision is then made over the buried needle, and if there is difficulty in finding it, the magnetized indicator is again employed. By this method Monks, has found the removal of buried needles very easy. In order to be most successful the buried needle must be superficially placed.

Fascial Tubulization in the Repair of Nerve Defects.

E. G. KIRK and DEAN LEWIS, Chicago. *Journal of the American Medical Association*, August 7, 1915.

Kirk and Lewis, after noticing the uncertainty of results of attempts to repair severed nerves by the various methods in use, say that, while the best results in transplantation are obtained from tissues removed from the same individual, nerves and blood-vessels frequently cannot be sacrificed to bridge defects in nerves. A tube formed of fascia that would not collapse and undergo secondary cicatricial contraction would be ideal, as the supply is unlimited, and fascia, when appropriate conditions are provided, contracts no adhesions and remains viable. They have experimented with tubulization of the sciatic nerve in forty dogs. Ten of these are still living, from seven days to nineteen weeks after operation, and seven specimens have not been studied histologically. The report is made of the study of twenty-two specimens, the animals having been killed at periods varying from one day to sixteen and a half weeks after operation. After exposure of the nerve and the removal of a section of it, a rectangular piece of the fascia lata was taken. The smooth, shiny under-surface was used for the lining of the tube. Care was taken to avoid injury to the nerve fascia and surrounding tissue, and hemostasis was made as perfect as possible. The suture was applied loosely so as not to strangle any portion of the nerve, and hemorrhage from the nerve ends controlled. The tube was made of sufficiently large lumen to be twice the size of the nerve end to guard against secondary contraction. Dogs of all ages were used. Immediately after death the nerves were excised, stretched on glass tubing, carefully orientated, and fixed. Usually two methods were employed in the histologic study, the most important being the Cajal silver method, as modified by Ranson. The criteria as to the success of bridging are stated. Recovery of function, which will require months, cannot be used on account of some anatomic peculiarity of innervation in the dog, for fair function returns about as soon as the postoperative tenderness is gone. Improvement in the foot drop is probably indicative of success, but a failure of it to appear in the earlier weeks does not mean that the defect has not been successfully bridged. The reac-

tion to electric stimulation cannot always be depended on in estimating the amount of repair, and the best criteria of regeneration are the gross appearance and the histologic findings. Kirk and Lewis give the details as observed after various periods in the experimental animals. The axis cylinders and medullary sheaths of the distal segment degenerate almost completely in the second and third weeks, while a solid downgrowth from the proximal stump gradually invades the pulpy material in the tube. The axis cylinders develop first, most rapidly along the side of the tube, and at the end of the fourth week, the gap of 1 cm. or less in length is almost completely filled with a white substance longitudinally striated. At the fifth week the proliferative and regenerative changes are very marked. A serious objection raised against fascial tubulization is its tendency to contraction, but that it can be used successfully was shown by a patient operated on by one of the authors who had a complete return of function after its use. Their experiments showed them that defects in nerves can be successfully bridged by fascial tubes, the time required depending on the length of the defect and the age of the animal. They believe that the possibility of cicatricial contraction of the fascia is precluded when the proper technic is employed and the fascia inserted only under proper conditions.

The Treatment of Tetanus by Endoneural Injections of Serum with Nerve Drainage. (*Die Behandlung des Tetanus mit endoneurater Seruminjektion und Nervendrainage.*) FRIEDRICH KEMPF, Braunschweig *Archiv für Klinische Chirurgie*, July, 1915.

In the light of Meyer and Ransom's work which proved that tetanus toxin is taken up at the site of injury by the motor nerve endings and conveyed to the related spinal and cerebral centers, Kempf concluded, logically, that the greatest and fullest efficacy of antitoxin might be secured by introducing antitoxin endoneurally, thus blocking, as soon as possible, the spread of toxin in the nerve trunk and avoiding the permanent anchoring of the poison in the higher nerve centers. Kempf was quickened to try this method in two cases which reached his hands for treatment—particularly since all the recognized methods, *i. e.* subcutaneously, intramuscularly, intravenously, intraspinally, and intracerebrally—had proved to be of limited value.

Accordingly he exposed the large motor nerve trunks in the injured extremities and injected them with about 300 units of tetanus antitoxin. The wounds were closed. Improvement was apparent at once. The second case had small metallic canulae introduced into the nerves after serum had been injected. This was done so as to drain off any freshly manufactured toxins that might arise after the present toxins had been neutralized by the injected serum. The canulae should be made of flexible metal; silver is satisfactory. It is important to expose the large motor nerves and to inject each one carefully. Absorption of the serum is rapid and may be noted during the process of injection. Not only is the toxin blocked by this prompt absorption but the antitoxin travels directly to the motor centers and thus saves the centers from attack by the rapidly mounting toxin. For wounds of the head region it is essential to inject the third branch of the fifth nerve and the seventh nerve.

Some permanent injury to the nerve follows this mode of treatment, the author admits, but he states that this is of minor significance in aiming at a recovery from a disease as fatal as tetanus.

Further Experiences with Corpus Callosum Puncture Especially in Epilepsy, Idiocy and Related Conditions. (*Weitere Erfahrungen mit dem Balkenstich, Speziell bei Epilepsie, Idiotie, und verwandten Zustände.*) A. STIEDA, Halle A. S. *Archiv für Klinische Chirurgie*, August 18, 1914.

Stieda says positively that puncture of the corpus callosum is a less serious procedure than lumbar puncture. Its usefulness is very great in conditions of cerebral pressure and the technique is rather simple. A preliminary trephine opening is made and a pliable silver catheter used.

He cites a group of cases treated by this "Balkenstich" method with the following results:

One case of epilepsy in a male at puberty showed a marked amelioration of symptoms directly after treatment, followed by a relapse to the original state, followed again by a period of 4 years duration, during which the attacks became mild and infrequent. Two cases of epilepsy in females at puberty had no symptoms after puncture, from 10 to 13 months subsequently. Three cases of true epilepsy were markedly improved. One case of imbecility since infancy lost its usual two or three daily attacks for one month; attacks returned but milder in character. A case of Jacksonian epilepsy maintained a decided improvement for four and one half years. An idiot, 13½ years old, showed a slight improvement, *i. e.* "was quieter and more normal." A case of microcephalus remained unrelieved.

There was no mortality following puncture nor any untoward symptom or physical sign.

Quinine After Operation. E. BONNOT and A. H. CLEVELAND, St. Louis. *Journal of the American Medical Association*, August 7, 1915.

Bonnot and Cleveland describe a modification of a method of administering quinine salts, a preliminary report of which was given in *The Journal*, January 9, 1915. "Quinine muriate, 10 grains, dissolved in two ounces of water at 100 F., is given by rectum immediately after operation, followed by saline proctoclysis or (in septic cases) by six ounces of olive oil. The quinine is repeated every six hours for from four to six doses. In large or stout individuals, the first two doses are given four hours apart. In case the saline proctoclysis is used, it should follow the quinine in about thirty minutes for best results." The postoperative backache has been practically eliminated and only about 2 per cent. suffer any gas pain to speak of, and if so one enema relieves. The postoperative nausea and vomiting are less frequent and reduced in duration, though vomiting occurs. Frequently a single stomach wash ends all nausea and vomiting permanently. Postoperative thirst is delayed, and is absent in 60 per cent. The patient usually has a free bowel reaction within twenty-four hours when morphin has not been given. The treatment is of special advantage when there is very much trauma, and did not interfere with pregnancy in a pregnant woman. It has been used in only two cases following chloroform. One did nicely, but in the other it had to be discontinued as cyanosis appeared. When it is used after chloroform, the authors advise waiting until the patient has regained consciousness. Patients feel comfortable after operation, and morphin is seldom if ever required. Sodium bromid, 20 grains, was associated with each dose of quinine in fifteen laparotomies with good results, and seemed to reduce the nausea and vomiting. The beneficial action of the bromid so administered was especially marked in eight goiter cases. The only complications observed were cinchonism in three cases, and one case of drug eruption lasting three days; but the patient did not suffer at all.

The Control of Pyocyaneus Infection (*Zur Bekämpfung des Pyocyaneus-eiters.*) E. UNGER, Berlin. *Berliner Klinische Wochenschrift*, March 15, 1915.

Based upon the principle that the pyocyaneus bacillus does not grow in acid media, Unger recommends that the wound be dressed with a liquor aluminii acetatis wet dressing, to which have been added a few drops of pure hydrochloric acid (five to eight drops to one-half liter of solution). Unger has found this measure remarkably effectual.

Pneumococcal Arthritis, With Report of Six Cases. J. W. SEVER, Boston. *Boston Medical and Surgical Journal*, September 9, 1915.

Sever reports six cases in detail and reviews the literature. In four cases infection followed previous pneumonia; the fifth resulted from tooth infection; the last from trauma. In all the diagnosis was confirmed bacteriologically. The mortality was 50%. Incision and drainage was used in practically all six cases. In the two cases that Sever was able to follow, the joints are practically normal.

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THE USE OF CONDUCTIVE ANESTHESIA
IN INTRAORAL OPERATIONS.*

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CINCINNATI, O.

The use of local anesthesia in minor operations and in certain major operations where it is especially indicated, is fast superseding general anesthesia in oral surgery. The recent development of novocain and suprarenin has placed this combination on as firm a foundation in surgical practice as the time-honored chloroform, ether and nitrous oxid.

Local anesthesia is especially indicated in those conditions where the nerve supply of the part is readily accessible to the needle. By injecting novocain into or around the nerve trunk supplying the part, an anesthesia can be produced in all the parts of the nerve peripheral to the injection. The essential principle of conductive anesthesia is to deposit the anesthetizing solution in the closest proximity to the nerve supplying the part, hence an accurate knowledge of the anatomy of the nerves supplying that part is necessary for rational procedures.

There are certain other principles to which we must adhere if we are to expect perfect results. We must use an anesthetic that we can inject in quantity without great danger of toxic effects. At the present time, one to two per cent novocain most nearly fills this requirement. The solution injected must keep the operative field anesthetized for a sufficiently long time, which phenomenon is produced by the use of suprarenin in varying percentage suitable to the needs of the operation. To get the best results it is necessary to have the solution injected resemble as nearly as possible a physiological solution in order that it will be absorbed by the tissues quickly and easily without the tumefaction or dehydration of the cells produced by too low or too high percentage solutions. Before a painless operation can be performed it is absolutely necessary to wait until the solution has passed through the perineurium and anesthetized the axones contained in the centre of the nerve. On the periphery this waiting period may be only a few seconds or few minutes at the most, but in conductive anesthesia of the inferior dental nerve, for instance, it is absolutely necessary to wait fifteen or twenty minutes before the solution has penetrated to the center of the nerve. The length of this time is lessened by the proximity of the solution to the

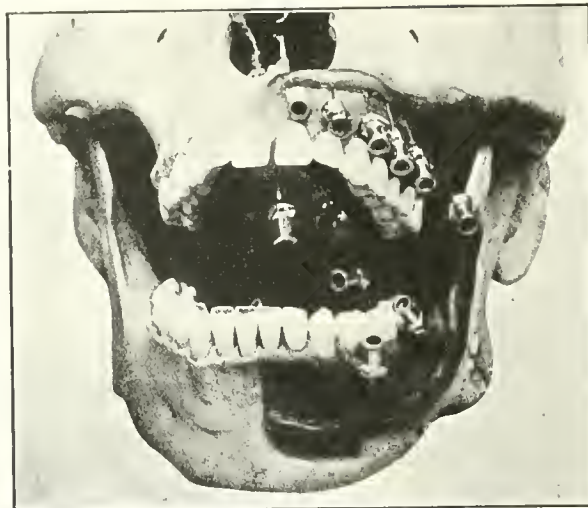


Fig. 1. Injection of the mandibular nerve, mental nerve, and dental nerves of the upper teeth. Note relations of the soft tissues in the posterior part of the mouth to the needle

nerve and by the use of a physiological solution in order that the absorption may be more rapid.

In conductive anesthesia of the mouth it is necessary to avoid as much post-operative pain and discomfort as possible. There are several causes of post-operative pain. Perhaps the greatest cause is the use of needles of too large diameter. Pain in other parts of the body is in direct proportion to the extent of the traumatism and the richness of the nerve supply. In the mouth we have a particularly sensitive area to work upon and it is necessary, to obtain the best results, that we effect our injection with as little disturbance to the tissues as possible. An iridio-platinum needle of twenty-two gauge is large enough for any injection in the mouth and will not give rise to untoward sequences if properly handled. Injections in the internal pterygoid muscle when blocking the lower jaw may occur if the needle is not held at least 1 cm. above the plane of the lower teeth. This will result in painful use of the muscle and in a trismus lasting a few hours or days. If the syringe is kept in alcohol it should be thoroughly rinsed, as the alcohol will cause pain and prolonged anesthesia as is noted when alcohol is used in the treatment of trifacial neuralgia. Failure to use a normal physiological solution will cause post-operative pain from the tumefaction or dehydration induced in the cells. Discolored solutions caused by oxidized adrenalin and suprarenin, the introduction of septic matter with the needle, the failure to use freshly distilled water in preparing the solution, are given as causes of post-operative pain, but it is assumed that the principles of surgical cleanliness will be used in this method as it is used in general remedial measures.

Conductive anesthesia is especially suited for op-

* Read during the Organization Meeting of the Interstate Association of Anesthetists in Cincinnati, May 4-5, 1915.



Fig. 2. Relation of the needle in the pterygo-mandibular space. The needles in the anterior part of the jaw show the injections for treating pyorrhea of the lower anterior teeth.

erations in the mouth. The nerves supplying the structures of the jaws are readily accessible to the needle when their correct location is known. Except for the mandibular nerve the terminal branches of the trifacial are of very small diameter which prevents an undue loss of time in waiting for the part to become sufficiently numb for operative work. A great advantage is that there are no large vessels or delicate organs in the neighborhood of the injection, which precludes any ill effects or accidents which might be present in other parts of the body.

The lower jaw is supplied with the mandibular nerve which passes obliquely outward and forward from the foramen ovale to the inferior dental foramen. The whole half of the mandible is supplied by this nerve except a small area of the mucous membrane on the buccal of the lower molars. The lingual nerve, a branch of the mandibular, supplies the lingual surface of the mandible and also the tongue. This nerve may be anesthetized by the same injection for the mandibular nerve.

The position of the inferior dental foramen varies slightly in different individuals. In young patients where the angle of the jaw is nearly 90 degrees the foramen is somewhat higher than in elderly patients where the angle is more obtuse. Likewise the angle formed by the union of the ramus and the body of the mandible varies in different individuals. These differences may be ascertained by careful observations before making the injection.

To inject the right mandibular nerve, for example, the external oblique line of the ramus is palpated with the index finger of the left hand. The

finger is then moved mesially until the rounded edge of the internal oblique line is found and the finger is then allowed to rest in the interval between these lines. The point of the needle should be inserted 1cm. or approximately a finger's breadth above the line of the lower teeth at the inner border of the internal oblique lines using the palpating finger as a guide. The needle should not be inserted straight posteriorly but should follow the inner surfaces of the ramus. Experience has shown that resting the barrel of the syringe in the region of the lower cuspid tooth of the opposite side will direct the needle in the proper plane. The patient's mouth should be wide open. Injecting too low will cause a stiffness of the internal pterygoid, injecting too high will result in failure to reach the nerve as it descends obliquely from the skull.

When the needle has been inserted 5 mm. a few drops should be injected to anesthetize the lingual nerve. The needle should then be carried back not further than 1.5cm. where 2cc. should be injected. Then inject 0.25cc. in the mucous membrane external to the molars to reach the buccal nerve, and in twenty minutes the jaw will become so anesthetized that any operation can be done painlessly upon it.

The great advantage of local anesthesia in the mouth is that there is practically no danger of the inspiration of blood. Under a general anesthetic it takes as much time to sponge the blood out of the pharynx as it does to complete the operation. With local anesthesia the patient is conscious, can take care of the blood himself and can even assist in the operation. When a bloodless field is desired suprarenin can be injected around the operative field after it is anesthetized with the result that the area is visible, which is not usually the case otherwise in oral operations.

This method will find approval in nearly every operation on the lower including partial and total resections of the jaw or the alveolar process, but of course in these cases ascending branches of the cervical plexus must be anesthetized. In removing sections of the mandibular nerve, in treatment of trifacial neuralgia, it is valuable. It is also useful in making a diagnosis in these conditions. Tumors are painlessly removed with some degree of pleasure when you are confident that the patient's breathing apparatus will not be flooded with blood. The impacted third molar, a bugbear under a general anesthetic, is removed as easily and sometimes more easily than an ordinary tooth when good access is had by the help of the patient. If conductive anesthesia were used only in the reduction of frac-

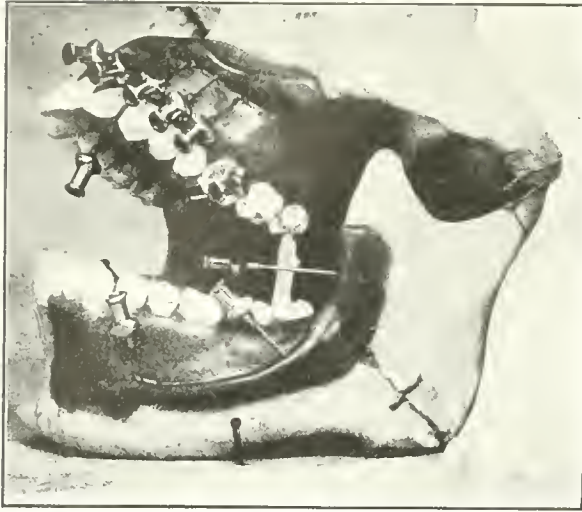


Fig. 3. Injection at the post dental foramen for antrum and upper molars.

tured jaw it would find a sure place in surgery. Formerly it was necessary to completely anesthetize the patient in order to get relaxation of the muscles, while now we can inject novocain at the inferior dental foramen and reduce the fracture easily and painlessly with the patient's assistance. Seldom if ever will it be impossible to inject the nerve through the mouth, but in cases of extensive swelling and traumatism the nerve can be reached by inserting the needle from the outside just behind the posterior border of the ramus.

In the upper jaw the structures are supplied by the superior maxillary and the descending branches of Mechel's ganglion. The superior maxillary nerve leaves the skull by the foramen rotundum, passes through the spheno-maxillary fossa and enters the infraorbital canal. It gives off a communication to Mechel's ganglion and three terminal branches to the jaw, the posterior dental, the middle dental and the anterior dental, besides sending branches to the upper lip, side of the nose, and lower eyelid. Mechel's ganglion, through the descending palatine, accessory palatine and naso palatine nerves, supplies the nasal septum, the lower part of the nasal cavity, the soft palate, tonsils, and hard palate. By careful technic operations on these various parts may be performed painlessly with the patient conscious.

Injection of the superior maxillary nerve is rarely done. It is seldom necessary as the part to be operated upon can usually be controlled by injection of the terminal branches to the nerve. To inject the posterior dental nerve palpate for the malar prominence from the inside the mouth, start the needle in the fold of the cheek opposite the second molar tooth and insert the needle along the bone for

a distance of 1.5cm. when the posterior dental foramen will be reached. By anesthetizing the nerve at this point the posterior surface of the antrum and the three upper molar teeth will be desensitized. Injection above the bicuspsids will reach the middle dental nerve. Injection at the infraorbital foramen will anesthetize the anterior part of the jaw, the lips, side of the nose and lower eyelid. The palate can be rendered completely numb by injecting at the anterior and posterior palatine foramen.

By these simple injections many of the operations usually performed under ether may be done with novocain. Resections, removal and cauterization of tumors, extraction of teeth, fractures and practically all the minor surgery of the upper jaw can be performed through the mouth or from the face by injecting at the posterior dental foramen and above the bicuspsids. The removal of the floor of the antrum in necrosis under local anesthesia transforms a disagreeable operation to one of comparative ease when the patient can watch the blood.

In hare-lip, the parts can be rendered insensible by injection at the infraorbital foramen. In double hare-lip the central lobe must be injected separately. By this method the union can be made much more satisfactorily when the direction of the muscles can be studied during the operation. Simply sewing a lip together produces a union, but it does not prevent a permanent deformity unless the direction of the muscle fibres be carefully studied and sewed together in their proper relations. The motor supply



Fig. 4. Injection at anterior and posterior palatine foramina for operations on the palate.

is not affected by this injection allowing movement of the muscles which of course is impossible under a general anesthetic.

Cleft palates are usually attempted at an early age. When this operation is performed later in life it is often done to advantage under a local anesthetic. In order to secure perfect results, it is necessary that the surgeon have all the facilities possible. It is not to his advantage to have the patient's head hanging over the table or turned to one side to keep the blood out of the larynx. The wrenching, vomiting, and sickness following ether, or chloroform, which usually results in the stitches being torn out, is entirely eliminated. This is one of the most important factors for a favorable prognosis. This method is particularly advantageous in repairing clefts of the velum, in the correction of a former operation, or in repairing small openings in the hard palate.

The rapid healing of wounds when anesthetized is another advantage. It has been carefully worked out and proven that wounds heal much more quickly when the pain is abolished or when the sensory supply is cut off. Anesthesia in the therapy of inflammation is no longer an experiment but a well proven fact.

The object of this paper is to bring to the attention of the anesthetists present some of the more recent developments along this line of anesthesia of the oral cavity. To cover this subject thoroughly in a single paper is impossible. Rather, it has been the object to outline the various indications of this anesthetic in the mouth and to point out its advantages in certain operations. The mouth has always been a difficult place to operate upon, chiefly because of the unfavorable position on the table and because of the troublesome hemorrhage. With some experience the use of conductive anesthesia will eliminate many of these disadvantages and render our patients an inestimable service.

ANDREWS BUILDING.

DISCUSSION.

DR. BION R. EAST, Detroit, Mich.: There are a few points in Dr. MacMillan's paper which I wish to touch upon. First regarding the use of adrenalin. If used after the injection of cocaine or novocain there is remote danger of any toxic effect. However the adrenalin preparations are among the most active drugs known in chemistry, and must be used in minimal dosage and with due discretion. The combination of sodium chloride or any other salt in a tablet which contains adrenalin or suprarenin is unsatisfactory, and, I think, unscientific, for the reason that the salt will absorb moisture enough from the atmosphere to cause deterioration, with consequent bad results if the discolored tablets are used for injected solutions.

After selection of the drug the vehicle which carries it into the tissues is the next in importance after thorough antiseptic precautions have been taken with regard to the syringe and site of injection. Sodium chloride alone is a protoplasmic poison, and requires the addition of calcium and potassium salts; hence the value of freshly prepared Ringer's solution. When a nerve is injured, for instance, or cut, the tissue itself begins at once to deposit potassium salts in the perineural tissues. The more potassium formed the fewer impulses are carried to the brain, which would suggest that we should have the natural local anesthetic in the vehicle which we inject.

Cocain is very toxic when not supported, but when combined with such a drug as chlorotone, it seems quite safe. In the dental clinics in Detroit, where we have extracted 25,000 teeth during the past year, with some of the operators not of great experience, we have yet to discover the toxic action of cocaine. Our patients have been children averaging between nine and ten years of age. We have used cocaine and chlorotone in all cases. We give instructions to our operators to be scrupulously clean.

In agreement with Dr. MacMillan, our experiments on dogs have proven almost conclusively that tissues heal more rapidly if they can be kept obtunded. A most important thing in local anesthesia is to operate shortly after a meal and never on an empty stomach. I am riding the hobby of conductive anesthesia very hard, teaching it continually, and in my personal use and in my observations of the work of my associates I have yet to observe any bad results.

COLOR CHANGES AND THE MARGIN OF SAFETY IN NITROUS OXID ANESTHESIA.*

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The effect upon respiration of variations in the oxygen and carbon dioxid tensions in the blood is of fundamental importance in the scientific study of narcosis. Especially is this true in the case of nitrous oxid anesthesia, where the mildly depressant action of the gas is modified by factors peculiar to the use of a closed system and to the consequent extension of the dead-space of the lungs. Here we are called upon to regulate the partial pressures of at least three gases: (1), nitrous oxid; (2), oxygen, and (3) carbon dioxid; and occasionally a fourth, ether-vapor.

In the old days of the cone, it was customary to reduce the patients to unconsciousness by a method of partial asphyxiation. This effect was produced not only by administering an overwhelming initial dose of the anesthetic, but also in large part by the exclusion of oxygen. More or less cyanosis was the rule, and the excitement, and convulsive struggles so commonly described in the text-books as concomitant with the inductive stage of anesthesia, appear in the light of present day results to have been the effect more of the method than of the anesthetic. The signs of the primary stage were in many cases really the signs of asphyxia.

The extensive adoption of nitrous oxid anesthesia in the majority of large surgical clinics today, thanks to the pioneer work of Teter, Gwathmey, Gatch, McKesson and others, has re-introduced the problems of the so-called *closed method*. Gatch in his work on re-breathing has shown that the advantages of this system exceed those of any open method, and that the dangers if fully appreciated may be easily avoided. But are they fully appreciated?

Briefly the dangers of this system are three: (1), over-concentration of the anesthetic; (2), over-

* Read during the Third Annual Meeting of the American Association of Anesthetists, San Francisco, Cal., June 21, 1915.

ventilation of the lungs with consequent loss of carbon dioxid resulting in acapnia, apnea, and even shock; (3), deficiency of oxygen leading to anoxemia, asphyxia and respiratory paralysis.

It is my purpose here to review some recent epochal work on the physiology of respiration, which has opened up fresh vistas in clinical medicine and from this new viewpoint, to reconsider the dangers of the closed system, and their encroaching limitations on the margin of safety in nitrous oxid anesthesia. These observations will apply particularly to cases of great or increased surgical risk. By its very safety nitrous oxid has become the anesthetic of choice in an ever-increasing number of patients with serious pathological lesions and abnormal metabolism. It is this class above all, of serious, often desperate risk, which raises the mortality ratio. In fact, I believe these patients are the chief and practically the only concern of anesthetists proficient in the use of nitrous oxid. In all of them, let me repeat, metabolism is seriously disturbed; consequently the final oxidations are incomplete and acid-products tend to accumulate in the blood. There is an increasing strain upon the channels of elimination. The effect of this upon respiration and the carbon dioxid tension in the blood and alveolar air will be evident further on.

What I wish to emphasize here is: *First*—That the real danger in these cases is anoxemia or oxygen-lack: even very slight degrees of oxygen starvation being injurious if long continued. *Second*—That the warning sign of anoxemia is cyanosis, and the importance of careful observation and control of the patient's color can not be reiterated too often. This means the avoidance of prolonged cyanosis even in the slightest degree.

I am well aware that the dangers of asphyxia have been remarked before. Thus Gwathmey has succinctly epitomized the margin of safety in these words: "*If the patient is kept free from cyanosis and the anesthetist knows the difference between asphyxiation and anesthesia, a death from nitrous oxid and oxygen is impossible.*" But it may be asked how shall we recognize very slight minimal degrees of asphyxia? Gatch also has repeatedly warned against cyanosis, particularly when patients with cardio-vascular lesions are subjected to the Trendelenburg position. Obviously any anesthetist will endeavor to avoid marked cyanosis and other outspoken evidences of asphyxia. But the tendency to reenforce the action of the anesthetic with very slight degrees of asphyxia is constantly present in a closed system. Connell has shown that the depth of anesthesia increases directly as the oxygen

decreases, and that with nitrous oxid the zone of anesthesia in which the color, blood-pressure and respiration are normal, is frequently too light a zone for deep abdominal surgery unless supplemented by morphine narcosis, small quantities of ether, or local analgesia. And I postulate here that it is far better to reenforce the action of the gas with a small amount of ether than to produce surgical anesthesia by cutting down the oxygen supply.

PHYSIOLOGY OF THE RESPIRATORY CENTER.

Physiologists have long been divided into two camps over the question whether oxygen-lack or carbon dioxid-excess is the real intrinsic stimulus to the respiratory center. Rosenthal in the past championed the former view, while among present-day workers Haldane and Henderson have presented convincing evidence that slight changes in the carbon dioxid tension alter the respiratory rhythm. While it has been generally conceded that the center is more sensitive to slight changes in carbon dioxid tension than to corresponding variations in oxygen—the actual part played by the oxygen-tension has not been clear. Thus, although Lindhard has recently claimed that lowering the oxygen tension increases the excitability of the center, Henderson on the other hand has asserted that the function of oxygen is merely nutritive and that absence of oxygen paralyzes the neurones. This author further emphasizes the importance of carbon dioxid as the normal stimulus not only to the neurones, but peripherally to the cardiac, vascular, and intestinal muscles. In his work Henderson sought to demonstrate the existence of a venopressor mechanism. He emphasized the importance of carbon dioxid in maintaining the tonus of this system and warned against the dangers of over-ventilation and acapnia. More recently, Hooker at Johns Hopkins, while not denying that the total output of the heart is increased by small percentages of carbon dioxid, gives evidence to show that this increase is really due to relaxation of the pulmonary bed, and demonstrates conclusively that oxygen is essential to rhythmicity and tone in vascular muscle. Although his experiments show that carbon dioxid even in small percentages may depress cardiac muscle and relax vascular tone, he admits that the total effect may be beneficial, since the stimulating action of carbon dioxid on the medullary centers more than compensates for its depressant action peripherally.

Divergent as these various views may appear, it seems fair to conclude they are but reverse sides of the same shield, and that oxygen-lack, carbon dioxid-excess, and weak acids, may all act upon the center in the same way. The work of Hassel-

bach has put a period to much of this uncertainty by showing that the common factor underlying these various agencies is the regulation of the reaction of the blood, or as the physical chemists express it: *the H-ion concentration*.

Adopting Winterstein's hypothesis, Hasselbach demonstrated that changes in the carbon dioxide tension of the blood is one of the means by which the body maintains the normal neutral reaction of the blood and thereby protects itself against acidosis.

Carbon dioxide is, as we know, a weak acid and exists in the blood in such readily dissociable forms as the carbonate and bi-carbonate of sodium. These compounds by interplay with the sodium phosphates and proteins, are held in a state of delicate chemical equilibrium. Now if the acid-products of metabolism are augmented, some of the carbon dioxide is washed out of the blood through the lungs; more basic ions are liberated to neutralize the acid, and thus the H-ion concentration is maintained at its normal level. In this mechanism it is the specific function of the kidneys to separate the acid-radical from the base, and excrete the acid, thus preserving the sodium base for the body.

It is evident from these newer contributions that the real stimulus to the respiratory center is the H-ion concentration of the blood, and that in the regulation of this protective mechanism, the lungs play a rôle only second to the kidneys in importance.

An increase in acidity is forestalled by a change in the respiratory rhythm and consequent washing out of carbon dioxide from the blood. So it will be seen that lungs, kidneys, circulating system, and respiratory center are all intricately related and delicately coordinated in a protective mechanism whose function is to preserve the normal neutral reaction of the blood and prevent acidosis. The lungs have been described as *the more delicate balance wheel of this regulatory mechanism*.

With these facts in mind we are now in a position to review the dangers of the closed system and their effect upon the margin of safety in that large class of patients in whom the risk is increased by disturbances in metabolism. These dangers we have stated to be:

- (1) Acapnia
- (2) Over-concentration of the anesthetic, and
- (3) Anoxemia

ACAPNIA.

According to Henderson, carbon dioxide is the normal stimulus to the medullary centers and peripherally promotes rhythmicity and maintains the tonus of involuntary, cardiac and vascular muscles. If by excessive ventilation of the lungs, as in hyperpnoea, this normal stimulus is greatly reduced

in tension, the resulting acapnia will upset the normal osmotic tension in the fluids and tissues of the body, causing loss of fluid and tonus and terminating in a condition of surgical shock.

The recent investigations of Hasselbach and others which I have summarized would seem to indicate that Henderson's premises are not altogether complete and it is possible that his conclusions must be modified accordingly. Furthermore, Mann and his coworkers were unable to demonstrate experimentally that acapnia is a primary factor in the production of shock. Clinically it is a well known fact that in many individuals, a physiological apnea cannot be produced by hyperpnoea. Boothby has stated that in these cases there is a compensatory diminution of the circulation through the respiratory center, in consequence of which the gas-tensions are still capable of exciting the center, and he suggests that in shock due to forced ventilation there is an added factor of oxygen-lack.

Hoover and Gammon have recently shown that forced breathing is not so effectual in ventilating the lungs as has been thought. The optimum of respiratory volume is 1200 c.c. If the respiratory volume is increased beyond this amount, the effectiveness of ventilation does not increase proportionately with the increase in the volume of ventilating air. It may be questioned therefore whether it is physically possible to lower the carbon dioxide tension to an alarming degree by forced ventilation. On the other hand, as Hasselbach has shown, a lowering of the carbon dioxide tension may be an actual protection against acidosis where there is abnormal acid production. It seems fair to conclude therefore that the dangers of acapnia have been exaggerated, and this conclusion is supported clinically by the experience of many anesthetists. Certainly we have little to fear from acapnia in the course of a well conducted anesthesia, particularly if we employ with intelligence some method of rebreathing.

REBREATHING.

Aside from the question of its peripheral action, the stimulating effect of carbon dioxide upon the medullary centers is convincing evidence as to the value of rebreathing. Clinically this fact is evident enough, and it is unquestionable that rebreathing small percentages of carbon dioxide is an efficient means of raising blood-pressure, deepening the respirations, and warming the gases to body temperature.

DANGERS OF THE ANESTHETIC.

The importance of chemical purity of the anes-

thetic has been brought out by Baskerville. Certainly if pure nitrous oxid is used the danger of over-concentration of the anesthetic is negligible. But in the class of patients we are considering, with serious pathological lesions, myocardial, vascular or renal changes, in which the products of acid metabolism are frequently increased, can any anesthetic be held guiltless of toxicity?

The most conclusive answer to this question should be the mortality-ratio. Unfortunately there is no accurate, analytical compilation of statistics on nitrous oxid-oxygen anesthesia yet available. I speak advisedly, having in mind the importance in all such statistics of a careful analysis of the method employed; of the post anesthetic sequellae; and particularly of a critical scrutiny of the contributing causes to those sequellae in each case. A critical comparison in this way of two parallel series of cases is far more enlightening than a mass-accumulation of inaccurate statistics from different sources, since the accidental omission of a single death or post anesthetic complication entirely alters the significance of the mortality-ratio.

Gwathmey collected in his American statistics 8000 administrations of nitrous oxid and oxygen with no deaths. At the same time, Miller stated the death rate as varying between 1:100,000 and 1:750,000. Teter has reported approximately 10,000 cases with one death, and this not directly attributable to the anesthetic. Gatch, in a shorter series at the Johns Hopkins Hospital, had three deaths all due to contributory causes. Two of these cases were in desperate straits with circulatory changes so severe that the anesthetic could not be blamed. The third case was one of status lymphaticus. In at least one of these, the Trendelenburg position was an additional factor.

It must be evident from these statistics how uncertain the mortality-ratio is, and how much the margin of safety varies with individual cases.

Buckler observes that the most severe cases of post anesthetic vomiting in his experience followed short anesthetics of nitrous oxid-oxygen. He is convinced when all accidental causes can be excluded, such as neurotic temperament, drug idiosyncrasy, dilated stomach, etc., that persistent post anesthetic vomiting is invariably due to acid intoxication. In proof of this contention, Buckler has succeeded in greatly lessening the frequency of these disagreeable sequellae by flooding his patients, both before and after anesthesia, with alkalis and carbohydrates.

Crile, in his interesting contributions on anesthesia, has repeatedly urged the importance of preventing acidosis by preliminary dosage with mor-

phin and atropin and the administration of alkalis; and above all has laid stress on the importance of preventing the stimulation of so-called nociceptors through fear, pain and operative trauma. From H-ion concentration tests (of which the details are not mentioned) Crile claims to have found that the acid products of metabolism are increased under nitrous oxid anesthesia, as they are with ether and chloroform. In cases with a tendency to acidosis, he remarks that the increase in acidity produced by the anesthesia may be sufficient to overcome the already narrow margin of safety. Crile is convinced, however, that nitrous oxid is superior to the hydrocarbon anesthetics, because it is not a lipid solvent, and protects the reserve supply of molecular oxygen in the neurones.

It is possible that both Crile and Buckler have overlooked the most potent cause of acidosis in nitrous oxid anesthesia, a danger inherent in the closed system and due not to the anesthetic but to insufficient supply of oxygen. Oxygen-lack, even in slight degree, means an increase in acid production; and in pathological states the oxidation processes are faulty. In my experience, this is the chief cause of acidosis in nitrous oxid anesthesia, and if oxygen is administered with the anesthetic in sufficient amount to maintain a normal pink color in the capillary circulation, nitrous oxid and even ether in small percentages will not seriously increase the acid products of metabolism.

Personal observations made on two parallel series of 100 cases each, one under nitrous oxid-oxygen-ether anesthesia, the other under straight ether, would seem to offer some support to this contention. Where all other accidental factors could be excluded, such as palpation of the gall-bladder, gastric neuroses, drug idiosyncrasy, etc.,—post anesthetic nausea, vomiting and acetonuria occurred in 40 per cent. of the cases with nitrous oxid anesthesia, as contrasted with 55 per cent. where straight ether was used. The point of significance, however, is that there was a direct relation between the frequency and severity of post anesthetic vomiting and acetonuria, and the amount of cyanosis which occurred during the anesthesia. In almost every case where cyanosis occurred to any prolonged extent, nausea, vomiting and acetonuria were sure to follow. In this relation, the duration of cyanosis was a more striking factor than the intensity. Thus transient cyanosis, even though quite marked, frequently was not succeeded by these sequellae, while, on the contrary, low grades of slight duskiness, when prolonged for a measurable period of time, were invariably followed by post anesthetic evidences of acidosis.

THE IDEAL ANESTHETIC.

It has been generally held by neurologists that the synapses of the neurones are the weakest places in the reflex-arc, and consequently are most readily affected by changes in the oxygen and carbon dioxide tensions, and by foreign substances such as toxins, weak acids and drugs. Theoretically, therefore, the ideal anesthetic would have a specific affinity with a minimum or negligible toxicity, for the synapses of the sensory cells of the cerebrum, and would produce unconsciousness and anesthesia by raising the resistance at these junctions and thereby blocking the path of centripetal impulses to the somesthetic area. Whether or not it is necessary to reinforce this central effect by interposing a peripheral block, as Crile affirms, does not concern us here. Obviously, this ideal anesthetic does not exist, but it has become generally recognized in the majority of large clinics to-day, that nitrous oxide, in expert hands, more nearly meets these requirements than any other anesthetic. It has most of the advantages, and none of the dangers, of the hydrocarbon anesthetics. Thus it is non-irritating, non-lipoid solvent, is only slightly toxic, and does not attack the liver or renal cells. In this latter respect, it should replace chloroform as the anesthetic of choice in obstetrical cases with pernicious vomiting, or signs of eclampsia. The toxins, in pernicious vomiting as Williams has shown, cause a degeneration of the renal epithelium, and a necrosis of the central zone of the liver lobules. Since chloroform, according to Whipple, also produces a central zone necrosis of the liver cells, while ether is irritating to the renal epithelium, nitrous oxide—having neither of these effects—is clearly indicated in all such cases. On the other hand, in eclampsia there is a peripheral zone necrosis, and here again nitrous oxide is preferable to chloroform or ether. Finally, as evidence of the atoxic nature of nitrous oxide when administered with sufficient oxygen, Gatch has reported a case in which the patient was under nitrous oxide for five hours, yet regained consciousness within a few minutes after the mask was removed, and did not even suffer from nausea. And in concluding this evidence, one needs only to recall the classical experiments of Paul Bert, in which animals were kept alive in an atmosphere of nitrous oxide and oxygen for three days, to realize that acidosis under nitrous oxide is negligible if the supply of oxygen is adequate.

ANOXEMIA.

This brings us to a consideration of the third danger of the closed system, namely: anoxemia or oxygen deficiency.

It is this factor of oxygen-lack which I have endeavored to prove should bear the burden of blame and not nitrous oxide per se. Oxygen-starvation means acidosis, and a slight increase in acid-products, as Crile points out, is dangerous in cases with (1) hemoglobinemia, (2) shock, (3) cachexia or starvation, (4) toxemia, (5) cardio-renal changes, (6) pulmonary lesions, and various other conditions of disturbed metabolism in which there is frequently excess of acid products and consequent tendency to acidosis.

Nearly all of these patients may present one or more of the following signs and symptoms:

- (1) Color changes such as cyanosis or pallor.
- (2) Hemoglobin deficit.
- (3) Changes in the respiratory rhythm, as shown by various grades of dyspnea, with or without cyanosis.
- (4) Tachycardia, or bradycardia.
- (5) Lowered tension of CO_2 in the alveolar air and arterial blood.
- (6) Acetonuria, glycosuria, albuminuria.

In nearly all as a rule the hemoglobin reservoirs are low, and the final oxidations of the acid-derivatives of metabolism are incomplete. These acid-products are thus poured into the blood stream in excess and the protective mechanism which we have described is subjected to an abnormal strain. The neutrality of the blood is maintained almost to the end, but with ever-increasing difficulty. Lungs and kidneys are hard pressed to eliminate the acids. Thus in diabetes, for instance, Porges and Fridericia have shown that the carbon dioxide tension is depressed to one-half the normal degree. Porges and his co-workers found, also, that in cardiac disease with dyspnoea there is increased formation of acid bodies as shown by the lowered carbon dioxide tension of the alveolar air, and concludes that acidosis is the cause of this dyspnoea. Lewis and his associates have further concluded that in cardio-renal disease, where dyspnoea occurs without cyanosis, it is due to increased acidity, while in cases of dyspnoea with cyanosis, there is an added factor of oxygen-lack.

These patients with cardio-renal changes are certainly among the most serious risks which the anesthetist meets. The condition is especially precarious because slight degrees of myocarditis or interstitial nephritis often come to the table unrecognized. These patients demand more than the normal volume of oxygen in their tidal air, and slight degrees of asphyxia may fatally increase acidosis or produce a disastrous degree of heart-strain. The Trendelenburg position increases the

liability to this sequel. The injury to the heart muscle may not be evident at the time, since the heart may continue to functionate, but with a greatly lowered reserve power, until it is subjected to some additional strain. This may occur during the period of convalescence, when the decompensation is apt to be sudden and complete.

On the other hand, the most favorable groups among the conditions we have outlined are those with pulmonary lesions, and those in a state of surgical shock due to hemorrhage. It is always surprising for the first time to see how a woman, exsanguinated from a ruptured ectopic pregnancy, will improve under carbon dioxid, provided plenty of oxygen be administered, and the stimulus of carbon dioxid be kept up by rebreathing. The blood-pressure rises; air-hunger is replaced by deepening rhythmical respirations and the waxy pallor gives way to a warm suffused glow.

SUMMARY.

With any anesthetic the so-called margin of safety is a vague hinter-land bordered on one side by the primary stage of analgesia and semi-consciousness, and on the other side by coma, respiratory failure, and death. Beyond the threshold of conscious stimuli, these two extremes blend one with the other as the penumbra and umbra of a shadow. In the closed system with nitrous oxid as the anesthetic, the depth of anesthesia is dependent on the oxygen supply. As the oxygen is diminished the anesthesia is deepened, but the dangers are also directly increased. The best index for regulating the supply of oxygen and preventing anoxemia is the patient's color. In the color of the capillary blood as revealed by the mucus membranes, finger tips and ear-lobes, we have a biological reaction of the greatest nicety. This is far more accurate than any mechanical contrivance for regulating the volume of percentages of the gases, since it has been shown by Lindhard and Hasselbach that the threshold of excitation of the respiratory center, as well as the nature and size of the stimulus, varies from time to time in the same individual. The oxygen-demand is not a constant, but the real constant is the H-ion. The color of the capillary blood indicates with lightning rapidity the degree of dissociation of the oxyhemoglobin and the amount of carbohemoglobin present. Cyanosis means oxygen-lack, and carbon dioxid excess.

Unfortunately, nitrous oxid, by the very mildness of its depressant action, frequently compels the anesthetist to resort to accessory measures in order to produce a satisfactory depth of anesthesia. In this extremity, he should never resort to even

minimal grades of asphyxia. It is far better to use such methods as: (1) Preliminary narcosis; (2) Local anesthesia, and (3) the supplemental use of ether in small amounts.

In some cases it may be necessary to combine all three of these measures. A dram or two of ether will usually produce satisfactory anesthesia in these cases, with no harmful effects. A most important factor, as Gatch has shown, is the surgeon himself. He should learn to work in the zone of very light anesthesia.

CONCLUSIONS.

(1) In nitrous oxid anesthesia, the margin of safety is a broad one, and the dangers are seldom due to the anesthetic or to acapnia.

(2) The real danger is oxygen-lack.

(3) This danger is especially great in patients with a tendency to acidosis due to faulty metabolism.

(4) The most reliable control of the oxygen-supply is based on the patient's color. The warning sign is slight duskiness, pallor or cyanosis.

(5) Rebreathing of carbon dioxid in small percentages, up to 8 per cent., is beneficial, particularly in cases of surgical shock.

(6) It is safer to supplement nitrous oxid with other narcotics, or local analgesia than to deepen the anesthesia by decreasing the oxygen supply.

2677 CALIFORNIA STREET.

ANALGESIA, ANESTHESIA AND AMNESIA IN OBSTETRICS.*

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That from the very earliest times there has existed a desire to relieve woman of her suffering when in labor, is made evident by a perusal of the literature. Chronologically analgesia was first employed, later anesthesia, and more recent is the attempt to have amnesia present during labor as much as possible. Of course, the methods overlap in historical sequence, and in some cases two or even all three methods have been the aim.

Before considering the value of various drugs and other therapeutic agents that have been employed to produce these three conditions, I will take the liberty of reminding you that analgesia, or analgia implies relief of pain, or insensibility to pain and may be local or general. Anesthesia is loss of sensation, which may also be local or general. Local anesthesia includes local analgesia. General anesthesia necessarily includes local and

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general analgesia and amnesia. Whereas amnesia, forgetfulness, is inability of the memory to recall events that transpired while the amnesia was maintained.

Labor if normal is physiological, but the suffering has always been considered something to be avoided as far as is commensurate with safety, and the need of this in practice is increasing with each generation. The fetal head is a trifle larger, the female pelvis a trifle smaller, the uterine contractions a trifle weaker and the mother's nervous system much less able to stand the shock of a prolonged labor and all that that means.

During the time of Mesmer, mesmerism, or as we now call it, hypnotism, was not infrequently employed to help women during this troublesome event, and now we still use it in the form of suggestion and encouragement at every delivery.

Chloral and bromides are valuable analgesics when given to women who are worn out and cannot continue to deliver themselves. Under the influence of these drugs the patients fall asleep and awaken somewhat refreshed and able to continue their efforts. During the action of the drugs the uterus no further contracts and the labor is entirely discontinued.

Antipyrine in doses of fifteen to twenty grains per rectum in what is known as the Savitsky method has long been used by a few. It is supposed to allay the pains without appreciable delay of the labor. It is often combined with tincture of opium. It is advised as a first stage procedure, for under its influence the cervix is supposed to soften and more rapidly dilate. These drugs just mentioned are simple analgesics and are only given for temporary relief. Opium and all its derivatives naturally fall into this group, but as they have other uses, I will discuss them later.

Cocain is a drug that also was variously employed in labor. It was used by local application, by local injection, and intraspinaly. It is attended with dangers, and delays labor. Locally it was ineffective, and intraspinaly its action wore off after an hour and a half to three hours. The technic of these intraspinal injections is not simple and has potential dangers. These methods have been entirely discarded, but more recently cocain and novocain have been tried as parasacral anesthesia, by injection into the nerve roots at their exit from the sacral foramina. These injections are difficult to make and I cannot believe that they will come into general use. Stovain, after being tried in surgery, was also tried in obstetrics. It was believed to be less toxic and its action of longer duration than cocain, but it too has been discarded.

Quinin with urea hydrochlorid by local injection still has a few advocates but it offers little likelihood of becoming generally adopted.

Shortly after the introduction of ether and chloroform these two became very popular in obstetrics, and especially after Simpson, in 1847, applied chloroform in what has since been known as "*sleep à la reine*." Even in those countries where ether became the surgical anesthetic of choice, the obstetricians preferred chloroform. Chloroform has the advantage of quick action, little nausea, comparative pleasantness and ease and simplicity of manipulation. Its chief danger is post-partum hemorrhage. There is also danger of the child being born narcotized. Ether on the other hand, acts more slowly and is more apt to cause nausea and vomiting. It has been proven to be safer in the kidney complications of pregnancy. It causes less post-partum atony and hemorrhage, and after its administration the infant is less apt to be narcotized. Except in obstetrical operations where deep anesthesia is required, these two drugs are dropped on an open mask with the onset of each contraction, and anesthesia obtained with the height of the contraction "*takes the edge off the pain*." This can be repeated indefinitely with each pain until the labor is completed. If the anesthesia is pushed beyond this point the labor will not progress. Except for the undisputed dangers mentioned above the method is safe. But if used for more than the last few minutes of labor it should be administered by a trained expert.

Ethyl chloride has never been recommended in obstetrics except for operations, or where the head has already protruded so far that the obstetrician can deliver it without the aid of further contractions.

Nitrous oxid-oxygen requires the greatest care in administration. In principle it is used just as is ether or chloroform; i.e., as the uterine contraction starts, just enough gas-oxygen is administered to relieve the point of maximum pain. It should be given only by an expert whether used for a short or longer time. Its advantages are its rapid action and the rapidity with which the effects wear off. Its dangers are asphyxia of mother and child, and post-partum uterine relaxation and hemorrhage. The difficulty of application necessitates the presence of a trained anesthetist besides the trained obstetrician, thereby increasing the expense. The large quantities of nitrous oxid needed also add to the cost.

Before the derivatives of opium were so popular an occasional dose of opium or laudanum was given as a temporary analgesic. It was found that,

whereas it often delayed labor, it was not as persistent in this respect as was chloral, and if not given too near the moment of birth, was not only more efficient but likewise harmed neither mother or child. When after an average dose the labor was completed sooner than expected the child was often found to be slightly under the influence of the opium, with slowed pulse and respiration.

When morphin, or narcophin, heroin, or pantopon are used in single doses their effects are similar to those of opium and they act as ordinary analgesics. Morphin, heroin, and narcophin are simple alkaloids of opium; pantopon is a combination of alkaloids, and very efficient.

Quite recently Kapp, of San Jose, California, has advised the use of heroin in labor. He injects grs. $1/12$, and repeats as often as the effects of the heroin wear off. He claims that this method is safe for mother and child and relieves the woman of her suffering, keeping her in a continuous state of analgesia and thereby reducing shock.

During the summer of 1914, Prof. Ribemont Desaignes, of the French Academy of Medicine, announced remarkable effects from the injection of new opium derivative, called Antalgésin. He claimed that it promptly relieved pain with but slight slowing of the contractions and without harm to the infant. It has since been claimed that the preparation is nothing but morphin in solution. I have tried it in several cases and so far am only ready to say that it is a powerful analgesic, that it does delay labor, and that under its influence a certain proportion of babies will be born apnoic, and that I have seen in the mother no symptoms resembling the administration of ordinary morphin, excepting the analgesia.

During the last ten months the most talked-of method for allaying the pains of child-birth has been injections of scopolamin in conjunction with morphin, narcophin or pantopon. In 1902 Steinbuechel suggested the use of the combination of scopolamin and morphin in labor, but he and those who used it after him desired only to obtain analgesia. It was left to Gauss, of Freiburg, to recommend in 1906 the use of this combination in such a manner as to produce amnesia. This he termed "*Dammerschlaf*" (*Twilight Sleep*). The technic, as now perfected and used in over 6000 cases at Freiburg, is as follows:

Before labor starts, the condition of the mother's heart and kidneys must be known, the bony pelvis should have been measured, the fetal heart sounds located and the presenting part of the fetal oval ascertained. After having selected a quiet, dark room, and having excluded from it all but those

required at the delivery, everything should be put in readiness for the possibility of a hurried forceps extraction. When labor has advanced to where the cervix is two or three fingers dilated, and the pains recurring every five or six minutes, so as to rule out primary inertia, the patient is ready for the first injection. This first injection will consist of scopolamin grs. $1/150$ and morphin grs. $1/4$. The scopolamin should be either freshly dissolved or prepared according to Straub's instructions. According to the effect obtained from the first injection the obstetrician will wait thirty to fifty minutes, and if all is going well, give the second injection. This and all succeeding injections will be scopolamin grs. $1/450$ with nothing else. After the second injection time is not important. The indication for further treatment will depend on the amnesic condition of the mother, and on the strength, rate and regularity of the fetal heart.

The memory test should be applied every ten or fifteen minutes, and the general condition of the mother and the fetal heart should be constantly watched. With the slightest sign of returning consciousness another dose of scopolamin should be given. As the head is being born the pains increase so that the mother, if not sufficiently deep, will here develop an island of memory. If she is not well under at this time a few drops of some general anesthetic should be administered.

As the crying of the baby, like any other untoward noise, or a flash of light is apt to arouse the mother and cause an undesired island of memory, it will be wisest to at once remove the infant to another room. The mother should then be treated like any other parturient woman who has reached the third stage. Such patients are no more likely to bleed than are non-scopolamin patients, but there is this danger: that if hemorrhage does occur the mother may not perceive it, and therefore the watching for this possibility must be extra careful.

If the baby is oligopnoic it may be resuscitated in the usual manner. After regular breathing has once been established these babies should be treated like other babies. The puerperium will certainly not demand any more than the usual care.

This method has the objections that its technic is difficult and that it takes all the time of the obstetrician, much assistance, and surroundings that are often difficult to obtain.

Thus we see that where we wish to give the patient a complete rest and where no harm is awaited from a temporary discontinuance of labor, chloral or bromide with or without some opium preparation is very effective. For prolonged use ether is preferable, unless we can have the advan-

tages of an expert in handling nitrous oxid and oxygen. I feel that in proper hands Twilight Sleep is entirely safe, but its general use is at present quite impossible.

The fact that there is a safe method of allaying pain during parturition would abolish the fear of labor, that in some women becomes an obsession. Such a routine procedure would also have the advantage of preventing the shock of labor that at times causes women to be nervous for years after. According to Crile, if pain and other unpleasant sensations are allowed to travel along the sensory nerves so that they are eventually perceived by the brain-cells, causing hyper and then hypochromatism, and permanent damage of the cells, shock is produced. We must attempt to break this line of connection between the shock-producing agent and the brain-cell at some place where we will do no harm and not interfere with the physiological progress of labor. The blocking agent must not be more dangerous than the shock itself. Sensory depressants fulfill the first condition and the sensory depressants, scopolamin and morphin are reasonably safe, and act as a mild anesthetic, allaying the susceptibility of the brain. By blocking the painful sensations and making the mother oblivious to her surroundings and preventing the chromatic changes which lead to the injury of cells, those drugs tend to lessen shock.

The ideal method or drug I fear has not yet been found, for to be ideal it will have to comply with the following conditions:

1. It must be sufficiently easy of application so that it can be learned by the great mass of physicians practising obstetrics.
2. It must not in its application require too much additional time on the part of the obstetrician.
3. It must markedly reduce the pain and the memory thereof.
4. It must not appreciably delay labor.
5. It must not contra-indicate the use of other drugs which may be required during labor.
6. Its unpleasant effects must be less objectionable than the pain alleviated.
7. It must be safe for the mother.
8. It must not harm the child during labor, at birth or at any future date.
9. It must not cause post-partum atony of the uterus.
10. It must not produce nausea or other subjective disturbances.
11. There must be no deleterious effect on the nursing.
12. There must be no impairment of puerperal involution.

13. Asepsis and antisepsis must not be made more difficult.

14. Shock must be materially lessened.

As stated before no method at present recommended completely fulfills the requirements, but it seems to me that scopolamin and morphin used in strict adherence to the Freiburg technic, until some thing better is advised, must most often be the method of choice.

2 WEST 80TH STREET.

ALKALOIDAL MEDICATION IN RELATION TO ANESTHESIA AND ANALGESIA.*

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The administration of alkaloids before general anesthesia is of special interest to the anesthetist, greater interest than to the surgeon because for the time being the life of the patient is in his keeping. Deaths from anesthetics almost always occur during the operation, while those from operative procedures usually follow the completion of the operation. Simplicity in prescription writing and the administration of fewer drugs characterize the general attitude of the best medical men of the present. We read the prescriptions in the old textbooks and wonder how nature ever combated the action of so many drugs at the same time, and feel that the patient recovered not because of the medication, but in spite of it. Unfortunately today there is a tendency among some surgeons and anesthetists to return to this discarded medication as exhibited in the use of several drugs before, during and after anesthesia. Does not this smack of the old time *shot-gun* prescription, morphin, scopolamin, gas-oxygen-ether-novocain-quinin and urea hydrochlorid?

The advocates of this method glibly point out just what each drug is supposed to accomplish. Did not our forefathers also point out with just as much certainty the particular usefulness of each drug which they incorporated in their mixtures? Granting that this form of anesthesia possesses all the advantages claimed for it, is it to be recommended? It cannot be gainsaid that morphin, scopolamin and atropin alone or some combination thereof associated with general anesthesia have several substantial well defined advantages. The question which naturally presents itself is, what are the disadvantages? Do they balance the advantages or

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exceed them? If they do why is this method advocated? Allow me to consider briefly the action of the drugs most commonly employed before anesthesia, namely, morphin, scopolamin and atropin. Morphin and scopolamin are not antagonistic in their action, as is quite generally supposed. Any dose of morphin which produces systemic effects depresses respiration. The depression being characterized by a diminution in the rate, regularity and depth of breathing, scopolamin is not in any dose a respiratory stimulant and in large doses it is actively depressant. Morphin does not directly affect the heart, which continues to beat after respiration ceases. Scopolamin raises blood pressure but usually does not affect the pulse rate. Morphin, scopolamin and atropin all depress kidney function, which is of considerable importance, especially if the kidneys are involved in any pathological process which lessens their working capacity. Chloroform depresses both respiration and circulation. Ether is a stimulant to both respiration and circulation up to a certain degree of saturation and beyond that it becomes a depressant. According to a well-known law in therapeutics the combined action of drugs possessing the same effects is much greater than the sum of their separate action, and this law is especially emphasized in drugs possessing hypnotic properties. Theoretically the danger of combining morphin and scopolamin with chloroform or ether is apparent and practical experience has demonstrated that the danger is real. A smaller dose of ether or chloroform will paralyze the respiratory center if it is already depressed.

The advantages said to accompany the administration of alkaloids before general anesthesia are as follows:

1. Less of the anesthetic is required. Glandular activity is diminished, thereby reducing the danger of pneumonia. There is less vomiting before and during anesthesia, therefore a smoother narcosis and also less post-operative vomiting.

2. The patient's apprehension of impending danger is lessened or altogether abolished and he enters the anesthetizing room in a quiet, sleepy manner. No resistance is made to preliminary preparation.

3. The stage of excitement is less pronounced and muscular relaxation is more quickly developed.

4. The patient remains asleep after completion of operation, hence suffers less pain. Let us analyze these advantages.

(1) *Less of the anesthetic is required:* The lessened amount of the anesthetic required is not so important as is generally supposed. It has been conclusively shown experimentally that the degree

of concentration of the vapor is of much greater importance than the length of the administration or the amount used. A very concentrated vapor administered for a few minutes will do more damage to lung and kidney epithelium than a lesser concentration over a long period. In considering the lessened amount of the anesthetic used the action of the substance which replaces it must be taken into account. That the danger from ether or chloroform is diminished has certainly not been proved. On the contrary, a study of the reports of deaths or other bad results clearly shows that the premedication was actually responsible either indirectly by intensifying the action of the anesthetic or directly through its continued action.

(2) *Glandular activity is diminished, thereby reducing the danger of pneumonia:* Many of the postoperative pneumonias have nothing whatever to do with the anesthetic but are embolic in their origin and occur quite as frequently after local analgesia as after a general anesthesia. A pneumonia which develops later than 36 hours after anesthesia should not be considered as due to the local action of the inhaled ether. Since the open method of etherization has become so universally employed, the tendency to postoperative pneumonia and nephritis has been materially lessened.

If the head is turned to the side as soon as the neck-muscles are sufficiently relaxed to allow it, and this can be done early in induction, the salivary secretion will escape at the angle of the mouth or remain in the cheek where it can be sponged out. This position has the further advantage of preventing the tongue from falling back in the pharynx and obstructing respiration. That the aspiration of mucus ever produces pneumonia is a doubtful possibility. If ether actually predisposes to pneumonia it does so by its direct action on the lung epithelium, and it is just as reasonable to presume that the checked secretion would render the unprotected cells more susceptible to irritation.

(3) *Less vomiting before and during anesthesia; therefore a smoother narcosis and also less post-operative vomiting:* There will be no vomiting during the induction of narcosis if the patient has been properly prepared. Vomiting during anesthesia always indicates a light uneven narcosis; in other words, with proper technic an absolutely smooth anesthesia is obtained without preliminary medication.

That postoperative nausea and emesis are lessened is questionable. That vomiting may be delayed is quite understandable from the continued action of the morphin and scopolamin. Patients feel nauseated or begin to vomit several hours after their

return to bed or at a time when they should and probably would be over it if the nausea were due to the anesthetic.

(4) *Apprehension of impending danger*: Nervous patients can usually be quieted by a few cheery words and a little tactfulness in the way of suggesting an improvement or restoration to health. Joking and other forms of hilarity in the anesthetizing room frequently makes the nervous patient fear he is not receiving the close attention which the situation demands. Preparation of the field of operation during induction of narcosis shortens the anesthesia and helps divert the patient's mind from the anesthetic.

(5) *Stage of excitement less pronounced*: When the technic of the induction stage is properly carried out the so-called *stage of excitement* is either absent or so slight as to be scarcely noticeable except in alcoholics. If patients of the latter class are arranged on the table with restraint straps so that they can be controlled, stimulation passes off in a few minutes. The development of muscular relaxation is only a matter of a little more time.

If an opiate is required for the relief of pain it can be administered when the patient is sufficiently awake to complain. Then one can be guided by conditions as to indications and contra-indications for its administration. Following nitrous oxid, it can be given at the completion of the operation while the patient is still on the operating table.

Disadvantages of preliminary medication to general anesthesia may be summarized as follows: (1) Danger of respiratory paralysis; (2) Destruction of pupillary reaction; (3) Varying effects of the drugs; (4) Predisposition to pneumonia in mouth, jaw and throat operations. After-effects as vomiting, headache and a blocking up of secretions. Prolonged respiratory depression which may favor pulmonary edema.

Let us now consider these disadvantages.

(1) *Danger of respiratory paralysis*: In anesthesia the respiratory center is the especially vulnerable point and every hypnotic drug administered increases the danger of respiratory paralysis. Chloroform and ether are so evanescent in their action the patient revives in a comparatively short time when they are discontinued, but when enduring drugs have been administered hours may elapse before the patient is past danger. Furthermore should respiratory failure occur when only ether or chloroform has been given breathing will continue automatically when once re-established by artificial means.

(2) *Destruction of pupillary reaction*: I unhesitatingly place next in importance to respiratory de-

pression the destruction of the pupillary reaction. To one who is capable of interpreting properly this reflex it is of the utmost value. There is nothing else which will denote so absolutely the degree of narcosis, or give more certain warning of approaching danger or indicate it more clearly when it is already present. Eyelid, pharyngeal and corneal reflexes when present simply denote a light anesthesia.* The amount of relaxation in the muscles of the neck and jaw, especially the latter, is of considerable value, but not always reliable.

(3) *Varying Effects of the Drugs*: Because of the varying effects of scopolamin its purity was at first questioned, but it is now well known that equal doses taken from the same specimen affect different people variously, or the same person is variously affected at different times.

(4) *Predisposes to Pneumonia in Operations on Mouth, Jaw and Throat*: In operations on the mouth, jaw and throat an early awakening is most desirable. Morphin allays the reflex excitability of the air-passages, thus retarding coughing and favoring the retention of aspirated blood or vomitus in the trachea and bronchi, a condition which predisposes to pneumonia. Many people are unable to take morphin even in moderate doses without distress and vomiting and in such patients the disagreeable after effects of ether or chloroform would be aggravated.

Well trained, competent anesthetists frequently complain of the surgeon insisting on premedication although they themselves strongly object to it. To my way of thinking this is not playing fair. To handicap an anesthetist is unjust to him and not to the best interest of the patient. Surgeons usually defend their position by saying the patient belongs to them and therefore it is their privilege to prescribe as they see fit. The lack of real knowledge of the administration of anesthetics even among the most competent surgeons is very obvious when one of them attempts the role of anesthetist. The operating surgeon at best can have only a general idea of the patient's condition, while the anesthetist is in a position to follow closely the respiration and circulation throughout, and consequently is, or should be, more competent to judge the value of a procedure than the surgeon. For this reason surgeons who work with regularly qualified anesthetists should consult with them in the selection and administration of the anesthetic, especially in complicated cases. Further, the anesthetist should be allowed the privilege of giving or withholding alkaloids before anesthesia.

* The touching of the cornea is absolutely unpardonable and is as unscientific as it is unclean. Serious eye-infections frequently follow such uncalled-for practices.

Many surgeons give a single hypodermic of morphin before local analgesia, and undoubtedly it is helpful in producing analgesia. However, in checking up the results we found about half of the patients vomited after the operation and for that reason several of the surgeons working in the Presbyterian Hospital have abandoned its use.

Because comparatively few patients die while under the influence of anesthetic agents it does not signify that the proper anesthetic was selected or skillfully administered. The physician who specializes in anesthetics should be as fully alive to the best methods and alert to the advantages and disadvantages of certain procedures as the progressive surgeon or medical man is ready to seize and apply the most improved methods in his work. I do not feel that I am displaying any clairvoyant power when I predict that the time is rapidly approaching when medically qualified anesthetists will be placed in the position that the medical man, the surgeon, the obstetrician, the pediatricist, the pathologist, the bacteriologist now occupy. When the administration of anesthetics becomes a respectable part of medicine it will not be controlled by the operator and relegated to the least competent person to administer.

CONCLUSIONS.

1. That the administration of morphin, scopolamin and atropin before general anesthesia has certain advantages, but these advantages are not sufficient to counterbalance the risks attendant on their employment.
2. That a smaller amount of ether or chloroform will cause respiratory failure if the center is already depressed by hypnotic drugs.
3. That the loss of the pupillary reflex is a serious handicap, as nothing else indicates so unerringly the degree of narcosis.
4. That the danger from ether, chloroform or nitrous oxid is diminished is contrary to the evidence at hand.
5. That they should not be employed when untrained, inexperienced anesthetists are in charge, as the anesthetic is rendered more complicated and extra skill and judgment are required

110 S. ASHLAND BLVD.

DISCUSSION.

DR. MOSES SALZER, Cincinnati, O.: To discuss this very interesting paper intelligently, we must consider the various anesthetics involved separately. The physiological actions of chloroform, ether and nitrous-oxid are so fundamentally different, that it does not follow that because the preliminary use of narcotics may be harmful with one of these that it is harmful when used as a preliminary to the other two.

Chloroform, we all know, is a marked respiratory depressant. At the same time it is exceedingly powerful in its action, or toxic, and is very slowly eliminated. The use of any narcotic preceding chloroform is not only dangerous but unnecessary, as a smooth agreeable anesthesia is always possible without its use.

In ether, however, we have an agent which is much less toxic than is chloroform, which is more quickly eliminated and whose action on the respiratory center is less marked and less likely to

manifest itself suddenly. I agree with the essayist that the routine use of morphin, or any other narcotic, before an ether anesthesia is to be condemned. It should never be used in the very young, or the very old or in those in very poor physical condition, not only because of its possible danger, but because its use is unnecessary. When, however, adults who are in splendid physical condition are to be anesthetized, there can be no question that there is a distinct advantage in the use of a preliminary narcotic. I do not believe that in experienced hands the dangers are increased in this class of cases and there is no reason why we, as specialists in anesthesia, should hesitate to use morphin as a preliminary to an ether anesthesia, because it is not safe for a novice to do so. One may as well argue that because an appendectomy is a dangerous procedure in the hands of a novice, that it had better never be performed.

The physiological action of nitrous-oxid oxygen is so entirely different from ether and chloroform, that I am almost tempted to ask, is it safe not to use morphin as a preliminary to this type of anesthesia. No toxic effects of nitrous oxid, per se, are to be feared. The question of its elimination is not to be reckoned with, as this occurs all too quickly. It has no depressing action on the respiratory center. The respiratory center is more likely to be dangerously over-stimulated on account of the increased accumulation of carbon dioxide which can not be entirely prevented in the average case brought to surgical anesthesia. There is a tendency for the development of a dangerous irregularity of the breathing. The preliminary use of morphin not only largely prevents this, but makes for a smoother and safer anesthesia. Those cases in which opium or some of its derivatives can not be given as a preliminary to nitrous oxid anesthesia, are always sources of great concern to me. One of the reasons that I do not ordinarily give nitrous oxid to children, is because I can not give them morphin. I am, of course, in this whole discussion considering anesthesia for major surgical work. My narrowest escapes from fatalities were in those cases in which I had not used a preliminary narcotic. The patient wakes up all too quickly following a nitrous oxid anesthesia, even with the preliminary injection of morphin, and to deny them this would be the height of cruelty.

The claim therefore that the respiratory center is dangerously depressed and that elimination is seriously interfered with, when a preliminary narcotic is given, holds good for chloroform and, under certain conditions, for ether, but never for nitrous-oxid oxygen anesthesia.

I wish to say a word here also regarding the use of codein and heroin instead of morphin. I have used both of these drugs with very satisfactory results, especially the former, in grave genitourinary cases, and in cases where there seems to be a special idiosyncrasy to morphin. A dose of one grain of codein and 1/12 grain of heroin will correspond to about 1/4 grain of morphin. These drugs are less likely to be followed by nausea than is morphin.

ANESTHESIA FOR BRAIN SURGERY.*

CHARLES K. TETER, D.D.S.

CLEVELAND, OHIO.

The accomplishment of successful brain surgery requires greater skill and the exercise of keener surgical judgment on the part of the operating surgeon than does any other field of surgery. Extensive brain surgery is of comparative recent development and has largely resulted from the work done by Cushing, of Boston, Frazier, of Philadelphia and Rawlings and Horsley, of London.

The profession is greatly indebted to these men for the vast amount of literature which they have written on brain surgery, and for reporting their technics and methods in detail. Very little, however, has been reported regarding anesthesia in brain surgery.

The brain surgeons do not agree as to which is the best anesthetic agent for this purpose, but do agree, however, that the anesthetist should be one especially expert in administering anesthetics, inasmuch as the giving of the anesthetic is far more important than the selection of any special anesthetic agent. It is becoming more generally understood, that the safety of any anesthetic agent depends upon the expertness of the administrator. An

* Read during the Organization Meeting of the Interstate Association of Anesthetists, in Cincinnati, May 4-5, 1915.

expert anesthetist does not confine himself to any one agent or method of anesthesia, for he knows from experience that the modification of any method is necessary at times.

The human organism is such that there is no agent at our command which we can administer that will always act the same or produce the same results.

The skilled anesthetist will be able to use the proper agent and proper method as the exigencies of the case may demand. All anesthetists are not skilled, however, in administer all of the different anesthetic agents, and are, therefore, not familiar with the special technic required with the different agents, nor the physiological action produced by each.

It will not be my aim to enter into the discussion of all methods of anesthesia in brain surgery, but will confine this paper to the best methods of administering ether and nitrous oxid and oxygen.

Chloroform was formerly preferred and used in brain surgery, but in America, ether has practically supplanted chloroform, while in Europe chloroform still is the preferred anesthetic agent for this purpose. Nitrous oxid and oxygen has not as yet had a thorough trial as the anesthetic in this special line of work. However, if it is skillfully administered and properly supplemented with morphin and ether when necessary, it has by far the greater possibilities.

When cases requiring brain surgery are presented for operation, they are usually in a semi-conscious comatose or dulled mental condition, and, therefore, need a comparatively light general anesthesia.

Again, too, the nature of the tissues are such that after the scalp has been cut through there is very little pain produced by the operative trauma. We do not meet with the rigidity in these cases that we sometimes encounter in abdominal surgery under nitrous oxid and oxygen, so it is possible to induce and maintain a quiet anesthesia with nitrous oxid and oxygen in brain surgery, and at the same time, eliminate all interference with normal oxidation, thereby maintaining an even blood pressure, good respiration and an excellent pulse.

There are certain requisites that should be observed in administering anesthetics for these operations regardless of the agent used. *Viz*: The anesthetist or his appliance should not be so located as to interfere with the operating surgeon or his assistants. The inhaler or mask should be so adjusted that it may be completely isolated from the field of operation and offer no chance of infection from this source. All appliance around the face

should be completely covered with sterile towels and sheet. I do not favor covering the anesthetist with a sheet as is practiced in some clinics for the reason that the anesthetist must have full knowledge of the progress of the operation that he may intelligently perform his part.

The continuous drop method of ether has no place in this line of surgery, as it is not possible to carry out the above requisites, unless Criles' nasal tubes and funnel are used.

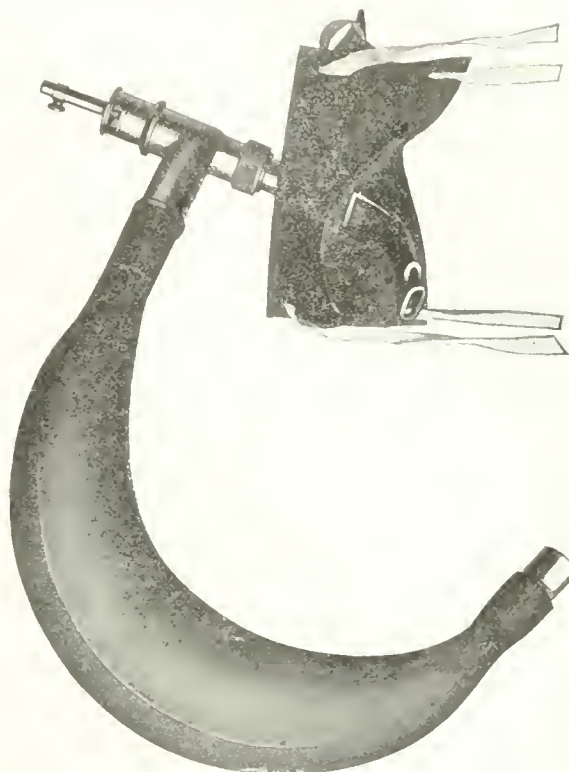


Fig. 1. Author's positive pressure pharyngeal inhaler for nitrous oxid-oxygen anesthesia.

This appliance consists of two rubber tubes, a "Y" connection, a glass trap and an ordinary funnel. The patient is anesthetised in the usual way by face mask and drop method of ether, and carried to complete anesthesia. The nares and throat are swabbed with 2 per cent. cocain solution, after which the tubes are inserted. Two rectal tubes are selected that will completely fill the nares, and these are passed into the posterior pharynx as far as the epiglottis. The tongue is pulled forward and damp gauze is packed at the base of the tongue completely filling the back part of the mouth, thus forcing the patient to breathe through the tubes. The funnel is filled with loose gauze and a layer of stocking net stretched over the large end. Ether is continually dropped into the funnel and anesthesia thus continued as desired. The glass trap serves as a catch for excess ether if used, and also

for the mucus as it may be thrown off during exhalation.

The disadvantages of this method are; (1) The length of time consumed from the commencement of induction of anesthesia until the special appliance is in position. (2) the frequency with which obstructions in the nose, such as spurs or deflected septum, are encountered.

The Gwathmey warm vapor method of ether with Lombard's small nasal tubes may be used to great advantage and success. This method consists of induction with the ordinary face mask and drop ether or may be modified by having a small perforated tube surrounding the base of the mask through which ether vapor is forced.

When surgical anesthesia is established, the mask is removed and two small rubber tubes are inserted into the nares, passing them into the pharynx. A continuous stream of warm ether vapor is forced through these tubes, from either a foot or hand bellows forcing air over or through the ether contained in the bottle. The patient may breathe either through the nose or mouth with equally good results because the nasal tubes should be of such size as to not offer any great obstruction to the egress of the exhalations through the nose. A tube may be passed through the mouth into the throat and the vapor delivered in this manner, but as good results will not be obtained as by the use of the small nasal tubes.

The administration of nitrous oxid and oxygen in brain surgery may be used with the maximum efficiency as we have now developed perfection of delivery and accuracy of dosage with these gases. The only objections to nitrous oxid and oxygen in these cases heretofore were the increased congestion of the brain and accompanying increased blood pressure, also the interference of the face mask with the surgeon. These objections no longer exist.

In 1906 I administered nitrous oxid and oxygen for brain surgery for the first time. In 1907 I reported a number of cases.* It was proven at that time that the dilatation and the congestion of the brain were not due *per se* to the effect of the nitrous oxid but was an entirely asphyxial manifestation.

By the perfecting of the technic, a nitrous oxid and oxygen anesthesia may now be given with certainty, which will be void of all asphyxial symptoms in 90 per cent. of brain surgical cases. The ten per cent. may be successfully and safely anesthetized by supplementing the nitrous oxid and oxygen with a small amount of warm ether vapor.

I perfected a positive pressure pharyngeal inhaler two years ago, which embraces the following fea-

tures. It delivers the gases into the pharynx under any desired pressure; it assures an unobstructed respiration; it is self-retaining and all may be completely covered over and isolated in head or neck surgery.

This inhaler consists of a curved, flat, metal tube which extends to the epiglottis and conforms to the base of the tongue. There are four openings at the end of this tube. These are so arranged there can be no obstruction of the tube. At the outer end of the tube are lead serrations for the teeth. There is a rubber pad stretched over these lead serrations, so shaped that it rests between the gums, teeth, cheeks and lips. On the outside of this is a wide rubber band, which is tied around the head or neck, thereby, retaining the inhaler in place.

Generally a sedative consisting of one-sixth grain of morphia or one-sixth grain of pantopon, is given one-half hour before the operation.

Anesthesia is induced by means of the small nasal inhaler. Profound anesthesia should be secured in about three or four minutes at which time the mouth is opened and the pharyngeal inhaler placed in position. While this inhaler is being adjusted, the nasal inhaler is left in place and the gases allowed to flow through both inhalers until the adjustment is completed, at which time all the gases are allowed to flow through the pharyngeal inhaler. The nasal inhaler is then removed, and a clamp put on the nose. All of this change may be accomplished in much less time than it takes to describe the method.

This is my method of procedure, not only in head, neck and brain surgery, but also in all cases of prolonged operative surgery. It is now possible to give all patients the advantages of a nitrous oxid and oxygen anesthesia regardless of the nature of the operation. This fact will make it possible to operate upon many critical cases which heretofore could not have hoped for surgical intervention.

Since the knowledge of an anesthetist should include more than simply administering the anesthetic, I will conclude with a few words in regard to precautions to be taken against shock in brain surgery:

(1) Increased blood pressure is to be avoided in this line of work. The anesthetist should, therefore, be informed in regard to the blood pressure by an assistant assigned for this purpose. Increased blood pressure may result from obstruction to respiration, improper proportion of the gases or other faulty technic. If sufficient depth of anes-

* Paper read before the Thirtieth Annual Meeting of the Pennsylvania State Dental Association, July 9, 1907.

thetia cannot be obtained with nitrous oxid and oxygen without intercurrent asphyxia, it is much safer to supplement the gases with a small amount of ether and oxygen given in sufficient quantities, to eliminate all interference with normal oxidation.

(2) Loss of blood should be prevented as far as possible. In severe cases of hemorrhage, it may be advisable to bandage the limbs from below upward, because in so doing, the supply of blood to the vital centers will be increased.

(3) The head and shoulders of the patient if raised upon pillows or sand bags will have a tendency to lessen the shock.

(4) The patient should be kept warm and the body heat preserved. The administering of the warm anesthetic vapors greatly facilitates this feature.

The success of any anesthetic depends greatly upon the skill with which it is administered. Many of the deleterious post operative effects of ether may be eliminated, when it is administered scientifically, and the same may also be said of all other agents. Each has its place. It is the trained anesthetist who recognizes the merits of all and respects the same.

I would, therefore, urge upon every anesthetist to perfect his technic and thus aim for a higher standard so that the surgeon, having experienced the pleasure of operating upon patients scientifically anesthetized with the proper agent, will demand the best anesthetist available.

ROSE BUILDING.

DISCUSSION.

DR. W. I. JONES, Columbus, O.: It is my opinion that the very same reasons that are advanced for the superiority of nitrous oxid oxygen over chloroform, ether, ethyl chloride and other anesthetics are sufficient ones to make it the anesthetic par excellence in brain surgery. The one main objection that some operators have to gas-oxygen anesthesia, namely, lack of relaxation, is here no objection whatsoever because it is possible to have unconsciousness to pain without complete relaxation, and as complete relaxation is no longer considered the essential element in modern surgery, it would seem to me that nitrous oxid oxygen is the anesthetic of choice.

The fear that some operators have expressed of apoplexy resulting from nitrous oxid oxygen anesthesia is without foundation. I am convinced of this from my own experience in administering gas-oxygen for brain surgery, and in a number of experimentations performed upon dogs by Dr. McPeck and myself in the Physiological Laboratory of the Ohio State University Medical Department.

We found that it is possible to have deep surgical anesthesia before there is any turgescence of the vessels of the brain and that a rupture of a blood vessel in the brain is highly improbable, because to produce it you must go far beyond surgical anesthesia. In our experiments, even when we had purposely produced the death of the animal by asphyxiation and there was present great cyanosis and turgescence, there was no evidence of ruptured blood vessels. I cite these examples not to invite carelessness upon the part of the anesthetist and lead him to disregard the danger signs, but to prove that the danger of apoplexy is very remote.

FEATURES IN THE JANUARY SUPPLEMENT

MAGNESIUM SULPHATE ANALGESIA.
D. D. DeNEEN, M.D., F.A.C.S.,
Cincinnati, Ohio

BLOOD-PRESSURE UNDER ANESTHESIA
E. I. McKesson, M.D.,
Toledo, O.

INTRATRACHEAL INSUFFLATION.

BENJAMIN MERRILL RICKETTS, M.D., F.A.C.S.,
CINCINNATI, O.

As early as the middle of the sixteenth century Vesalius I. recognized the possibility of aerating the blood, after the chest had been opened, by passing a continuous current of air through the lungs.

Vesalius, 1514-1564, a Dutch physician, journeyed from Luvain, now in Belgium, to Venice by way of Perpignan to Cyprus, with Malatesta, then commander of the Venetian forces on the Island.



Fig. 1. 1514—Vesalius—1564.

Thence to Jerusalem on a pilgrimage to the Holy Land.

He was requested to open the thorax of a man supposed to be dead. The heart began to beat, but he soon died. Vesalius was prosecuted for murder. The King of Spain saved him and he continued on his journey to the Holy Land, from where he started on his return to Padua to occupy the chair vacated by Fallopius, who had recently died. Fallopius had been his bitter enemy.

A storm raged on the Indian Sea, during which his ship was wrecked. He took refuge on the

* Read during the Organization Meeting of the Interstate Association of Anesthetists, Cincinnati, May 4, 1915.

Island of Zakynthos, where he was found fifteen days after, exhausted from starvation, which caused his death a few days later.

Although very young when he died, he had become the most famous of anatomists, having produced more and added more to anatomical knowledge than all of his predecessors.

In 1667 Hook read before the Royal Society a paper entitled, "An Account of an Experiment Made by Mr. Hook by Preserving Animals Alive by Blowing Through Their Lungs with Bellows."

In his experiment, Hook, having laid open the entire thorax of a dog and removed the pericardium, sustained the animal's life, first by reciprocal inflation and deflation of the lungs, in imitation of normal respiration, and then by means of a constant current of fresh air under such pressure that all respiratory movements of the lungs themselves were suspended. Both methods were successful in continuing animation and the pulmonary circulation.

While mechanical respiration remained a valuable adjunct of laboratory experiment for almost 250 years, its failure as a human resuscitative measure in the practice of such surgeons as LeRoy



Fig. 3. 1728—John Hunter—1793.

of France, and John Hunter, Monroe and Dalrymple of England, forced the scientist, John Erichson, in 1845 to conclude that, "*In spite of all the improvement and modifications of the technique and the methods of inflation by bellows, mechanical respiration never again came into favor and was speedily forgotten when the postural methods came into use.*"

Marshall Hall was especially severe in his condemnation of forced mechanical respiration by means of bellows, and until 1887 the postural resuscitative methods of Hall, Sylvester, Schäfer, and Howard were extensively employed.

On July 23, 1887, Dr. George Edward Fell of Buffalo, N. Y., after all the postural methods of resuscitation had been tried and failed, by means of forced respiration saved the life of a patient who had taken twenty grains of morphine and some chloral hydrate, even after the pupils had dilated in the last stage of asphyxia. Within about three months following, Prof. Dr. Boehm of the Allgemeines Krankenhaus in Vienna saved the life of Dr. Langer by the same method.

Other successful cases of a similar character followed, and established a new epoch of artificial respiration. In practice Dr. Fell used an especially devised face mask and a tracheotomy tube, and later an intubation tube, the invention of Dr. O'Dwyer, connected to a single bellows and provided with a coronet piston exit valve, by the manipulation of which inflation and deflation of the lungs could be made to duplicate normal breath-

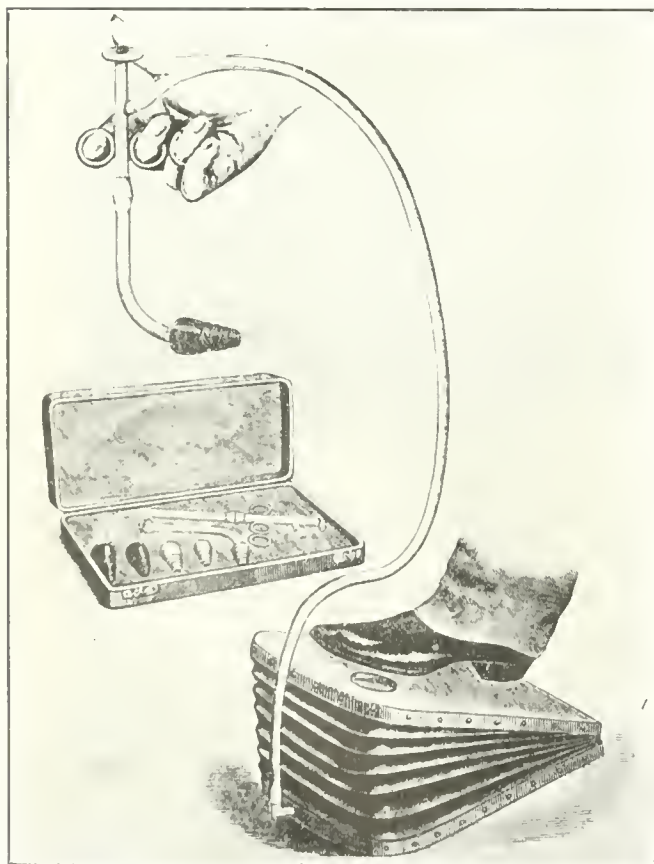


Fig. 2. The original Fell-O'Dwyer Apparatus as used in the Presbyterian Hospital of New York.



Fig. 4. George Edward Fell, M.D., the outstanding pioneer of intratracheal insufflation.

ing. In one instance, the case of Dr. Williams, reciprocal respiration was continued intermittently during four days, with recovery of the patient, and without any untoward pulmonary laryngeal or systemic complications.

It was through the incentive given to artificial respiration by the introduction of Fell's method of "forced respiration," and the adaptation of etherization to the technic, that the surgery of the thorax, through its utilization became a possibility. F. W. Parham of New Orleans was the first to successfully remove a sarcomatous growth from the walls of the thorax, using "forced respiration anesthesia" by the Fell-O'Dwyer method, for purposes of the narcosis and combating pneumothorax. The operation was performed under reciprocal breathing, and the chest walls were closed with the lungs fully inflated. Complete recovery of the patient ensued.

About 1896 the French surgeon, Tuffier, in association with Hallion, after exhaustive intrathoracic experimentation under continuous insufflation, concluded that, "the success of this method on animals justified its use in man." In 1902 Matas turned his attention to a solution of the surgical problems involved in pneumothorax.

Kuhn of Cassel, who had made intubation a specialty since 1895, in 1905 came out with a positive differential method for compensating pneumothorax, based on insufflation by intubation. He at first closed the mouth tight, but in 1908 improved his previous technic by introducing two tubes in

one, a narrow tube for inbound compressed air and a wider one for the exhaust. After many experiments on the human being, Kuhn found it advisable to keep the tube out of the trachea, and to stop it just below the larynx. While Kuhn demonstrated the pulmonary application of anesthesia by intubation to Czerny of Heidelberg, Trendelenburg of Leipsic, Angerer of Munich, and Lotsch of Berlin, visiting each of these surgeons personally, nevertheless the method was not favorably received for use in intrathoracic surgery on the human subject.

In 1908 Robinson of Boston intubated through the mouth to the bifurcation of the trachea, sending in air under pressure through a cannula, and letting the exhaust escape by way of the remaining lumen of the trachea. Later Robinson investigated the Volhard-Sollman method of oxygen insufflation, by means of which, during animal experimentation, life could be sustained without distention of the lungs; but he was distracted from perfecting this or the air-insufflation technic by becoming interested in progressive improvements



Fig. 5. 1805—Dr. Robert Peter—1894.

which he made in both the Brauer and Sauerbruch methods.

Mikulicz, however, must be credited with the first systematic investigation of the physiological problems besetting intrathoracic surgery. At his suggestion in 1903 Sauerbruch began a series of experimental researches, and in 1904 completed cabinets for intrathoracic surgery, using respectively positive or negative pressure.

While Sauerbruch soon discarded his hyperatmospheric apparatus in favor of his negative-pressure cabinet, Brauer, working independently, developed the first positive-pressure chamber to come into general use. The apparatus devised by Karewski resembled closely that of Brauer, as did also the initial cabinets of Janeway and Green. The devices of Tiegel and Brat-Schmieden were essentially of the emergency or laboratory type, although an effort was made to adapt them to the more exacting requirements of intrathoracic surgery on the human subject.

What Carrel has termed the *classical type* (cabinet) of apparatus has found its apotheosis in the new intrathoracic surgical pavilion of Willy Meyer at the German Hospital, New York, in which it is possible to operate differential, positive, or negative pressure at will.

Until the present popularization of intratracheal insufflation by the Meltzer-Auer technic, whatever real progress has been made in intrathoracic surgery on the human subject must be credited to the *classical type* of apparatus.

In 1908 Meltzer saw Sauerbruch doing intrathoracic surgery, and later witnessed some of Willy Meyer's operations at the Rockefeller Institute, and seeing both pleural cavities wide open and the animals continuing to breathe, but not trusting the evidence of his own eyes, he went into his laboratory to verify the experiments. A year later, in association with Dr. Auer, he published an article

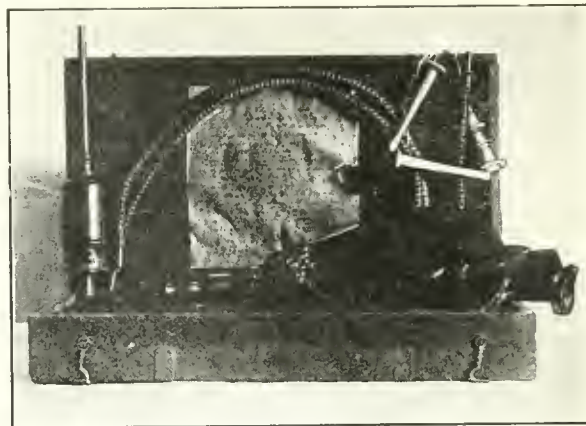


Fig. 7. An old type of intratracheal insufflation apparatus, (1750) purchased by Dr. Peter in Paris in 1836, and presented by his daughter to Dr. A. H. Barkley of Lexington, Ky.

on "Continuous Respiration without Respiratory Movements." After Meltzer had perfected the technic of intratracheal insufflation in his laboratory, Elsberg, with the assistance of Yankauer, developed an apparatus for its use on the human subject, and personally administered anesthesia by this method for a successful thoracotomy performed by Dr. Lilienthal at Mt. Sinai Hospital in 1910.

Meanwhile, Morriston Davies, after a thorough investigation of all the intrathoracic apparatus and methods in vogue, perfected and used a hyperatmospheric device, combining both the advantages of the cabinet and intratracheal insufflation technics, and to Elsberg, and Peck (New York) and Davies (London) belong the credit, not only of adapting intratracheal insufflation to the requirements of intrathoracic surgery, but also of demonstrating its value as a technic of narcosis in the surgery of the head and neck.

While the *classical type* of the cabinet and intratracheal style of apparatus are in apparent competition for supremacy, still each has its possibilities and its limitations, and further clinical experience alone will determine their respective utility in certain definite intrathoracic surgical procedures.

Physiological Considerations.—Progress in intrathoracic surgery has depended absolutely on the mechanical control of pneumothorax during the operative procedure. This mechanical control has varied in different methods, from that of Hook, now represented by the Meltzer-Auer technic, in which the lungs for certain periods have been so distended by a constant current of air as to preclude more or less any respiratory movements, to that of Vollhard-Sollman, in which the lungs have been allowed to collapse, while a current of oxygen sustained life.

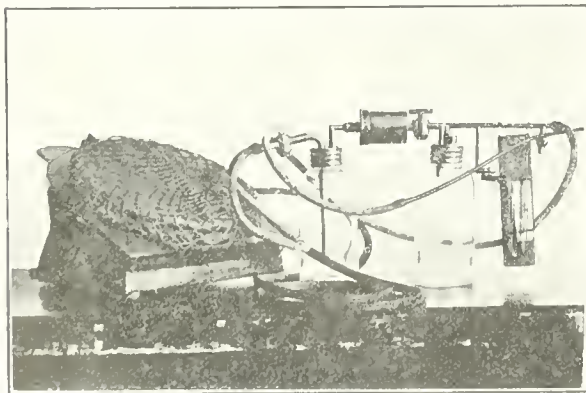


Fig. 6. A modern type of intratracheal insufflation apparatus.

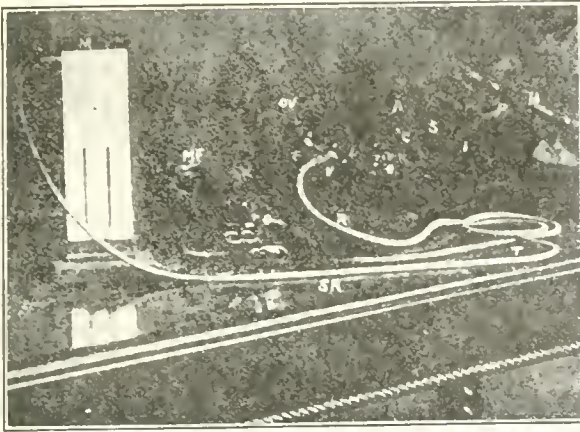


Fig. 8. Original model of the Matas intratracheal insufflation apparatus.

However, for all practical purposes, reciprocal breathing, under manometrically controlled positive, negative, or differential pressure, has proven the only safe method of compensating pneumothorax during intrathoracic operations upon the human subject.

Any consideration of pneumothorax involves an understanding of some elementary facts of the respiratory mechanism. Respiration is made possible in the thorax of the human subjects by a partial vacuum existing in the pleural space after the contraction of the lungs during expiration. This vacuum is represented by a varying negative pressure of from 4 to 10 mm. of mercury. Consequently thoracotomy requires either positive-pressure insufflation, with or without respiratory movements, or autorespiration in the negative or differential pressure cabinet, to prevent the collapse of the lung resulting in dyspnea, displacement of the thoracic viscera, shock, and death.

With the body of the patient within the cabinet in which the air has been rarefied to approximately the negative pressure in the pleural cavity (4 to 10 mm.) and the head of the patient is outside the chamber, permitting the respiring of normal pressure atmosphere, Sauerbruch, by varying the negative pressure as required, has been able to conduct intrathoracic operations with almost the same confidence as in abdominal surgery. In the Meyer cabinet differential pressure allows the surgeon to use positive, negative, or combinations of both pressures as needed. The great distinction between the cabinet control of the pneumothorax and intratracheal insufflation is that in the former autorespiration is depended on to conserve life, and already overtaxed and weakened nerve centers are called upon to formulate respiratory impulses, while during intratracheal insufflation these centers can be made to remain passive, thereby adding a

determining factor between success and failure. Moreover, in some operative procedures those muscles which participate in respiration are rendered inactive, thereby making the use of intratracheal insufflation all the more imperative. This demand is accentuated whenever during the course of any intrathoracic procedure dislocation of the posterior lobes of the lungs inhibits the usual respiratory movements.

Respiratory movements are not only concerned in the aeration of the lungs, but also contribute a factor essential to the normal maintenance of the pulmonary circulation and of considerable importance to that of the systemic. Thus the pulmonary circulation may be regarded as of double function, the ventricular, impelling the blood onward with rapid pulsations of the cardiac rhythm, while the lungs contribute the slower but more voluminous impulses of the respiratory cycle. (Davies.)

Hence it is that during intratracheal insufflation Meltzer has found it inadvisable to use a pressure which altogether suspends respiratory movements, resulting in apnea and CO_2 asphyxia, and suggests that, in so far as it is possible or necessary, the lungs be periodically deflated five or six times to secure not only a more satisfactory diffusion of the air and anesthetic in the smaller bronchi and alveoli, but also to eliminate CO_2 accumulation, and further to preserve the stimulus of respiratory movements upon the pulmonary and systemic circulations. In cases of open pneumothorax in which the respiratory mechanism is not paralyzed, spontaneous respirations offer the required aid to continuous intratracheal insufflation.

However, it is always advisable to arrange for

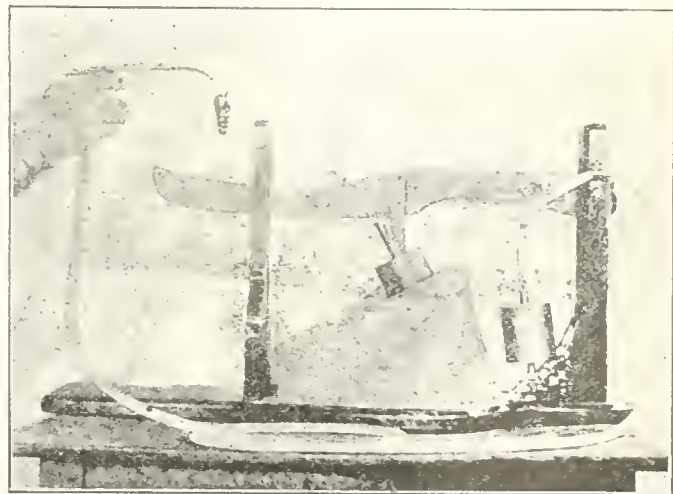


Fig. 9. Dr. J. D. Bloom's modification of the Fell-O'Dwyer apparatus as used by Dr. Parham in the Charity Hospital of New Orleans.

occasional interruptions of the continuous insufflation, especially in operations in which the thorax has to be laid wide open and the posterior and inferior portions of the lungs have to be dislocated, in which condition spontaneous respirations are of no avail. The occasional deflation of the lungs insures the continuance and efficiency of the pulmonary ventilation under all circumstances. It is essential, however, that this deflation be not allowed to result in a complete collapse of the lung, for reinflation under the circumstances may leave portions of the lung atelectatic.

Moreover, such deflation is valuable as a diagnostic factor in differentiating healthy from pathological lung tissue by the change of color and the presence or absence of proper distention. Again partial deflation is useful in left-sided pneumothorax, particularly in suturing the wounds of the heart, under which circumstances hemorrhage from the heart wound, according to Friedrich, diminishes in proportion as the lungs are allowed to collapse.

The partial pneumothorax thus becomes the regulator of the hemorrhage and is allowed to persist until suture of the heart wound has been completed, after which the pericardium and pleura are closed with the lungs properly reinflated.

Extensive laboratory experiments, which have been verified by post-operative results in the human subject, prove conclusively that so far as respiratory complications are concerned intratracheal insufflation is an innocuous procedure even in the presence of the lobar pneumonia. Also it has been found in practice that the recurrent air-stream through the trachea precludes the possibility of aspirating vomited material or hemorrhage from the pharynx.

Physiologically, the intrinsic value of intratracheal insufflation is exemplified not only in the original work of Fell, but also in the laboratory experiments of Shaklee and Githens on the treatment of strychnine poisoning, in which, although the very centers of respiration were paralyzed, intratracheal insufflation reached the climax of its usefulness as a measure of resuscitation and the conservation of life.

Meltzer has also found that anesthesia by intratracheal insufflation is far superior in many respects to the usual methods of administering ether. The anesthesia is much safer, far more readily controlled; less of the anesthetic agent is used, patients go under and come out more rapidly, and an efficient method of artificial respiration is immediately at hand to take care of untoward complications.

In recent studies on the influence of intratracheal insufflation on blood pressure and respiration, Meltzer and Githens found that a manometric pressure of from 30 to 40 mm. and a percentage of ether just sufficient to complete anesthesia, from 50 to 75 per cent. were innocuous, but that an increase of pressure and the percentage of ether for any appreciable length of time would result in an undulating fall of blood pressure, a slowly and diminished excursion of respiratory movements, with final cessation of breathing, although the heart continued to beat.

Resuscitation was possible in animals within 20 minutes by the insufflation of pure air. From the

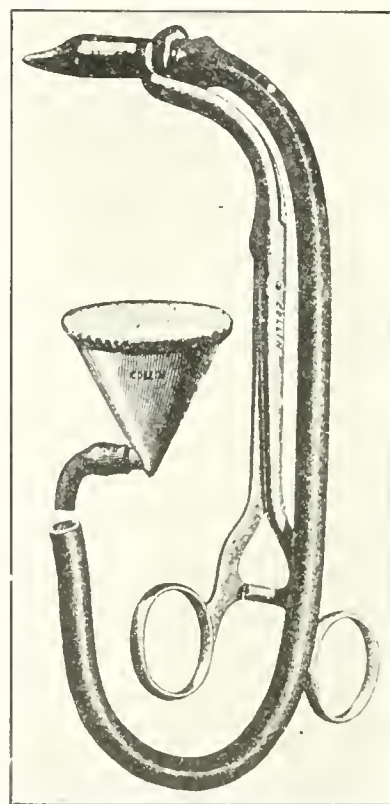


Fig. 10. Doyen's intra-laryngeal tube and cannula for chloroform anesthesia.

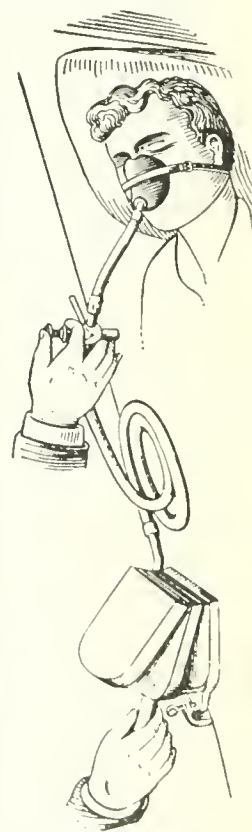


Fig. 11. The Original Fell apparatus for artificial respiration.

experiments it appeared that an overdose of ether first paralyzed the functions of the medulla and then much later the functions of the heart. Hence the caution in administering intratracheal insufflation to reduce the ether percentage in ratio to the shallowness and diminished rate of respiration.

Untoward respiratory and associated cardiac complications may also result from operative manipulation of the vagi and their branches, and the resulting false apnea may be controlled by the hypodermic use of atropin.

An increase of pressure, accomplished either by

means of the air current or indirectly by momentary pressure on the larynx, is valuable not only in gauging the proper distention of the lung, but also in obviating cyanosis and in overcoming the resistance of neurotic individuals to the anesthetic effects of the ether. All investigators have found it expedient to add a tank of oxygen to their armamentarium for intratracheal insufflation. Under certain circumstances a persistent cyanosis will develop, which nothing short of oxygenation will control.

While Brauer uses the Roth-Drager, and Davies

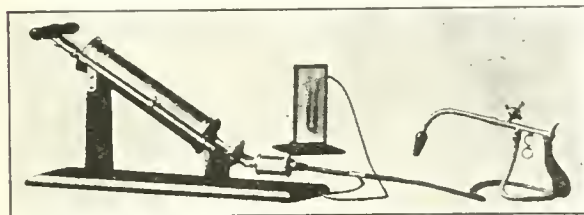


Fig. 12. Later working model of the Matas apparatus.

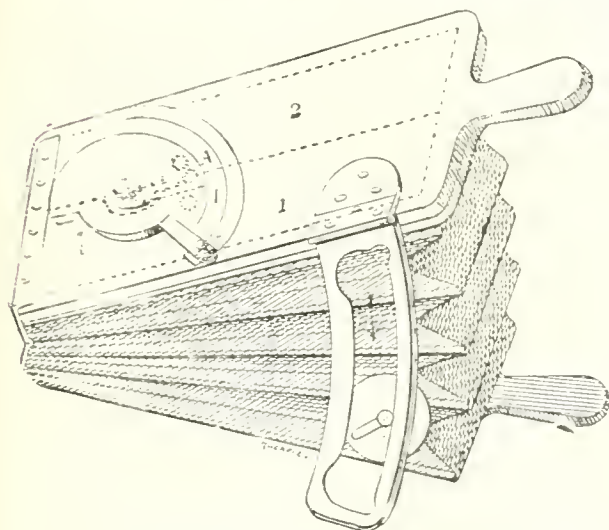


Fig. 13. Doyen's compound automatic hand-bellows for insufflation respiration.

the Alcock regulating chloroform apparatus in conjunction with mechanical respiration for purposes of pulmonary anesthesia, ether seems to be a far safer agent for routine narcosis by this method.

As early as 1827 Portal produced an artificial pneumothorax without thoracotomy by the injection of sulphuretted hydrogen gas into the thoracic cavity to place the lung at rest when affected with tuberculosis. Holmgren pursued the same principle of treatment for unilateral pulmonary tuberculosis even in cases in which adhesions between the visceral and parietal pleuræ contraindicated its use. Hamman of Johns Hopkins is now utilizing a similar technic with nitrogen gas. In the presence of adhesions the preliminary injection of saline

solution to collapse the lung is advisable before injecting the gas to produce the therapeutic pneumothorax.

Perforation of the thoracic wall does not always result in pneumothorax, unless the opening is larger in diameter than that of the glottis, or is valve-like in character as in oblique puncture of wounds. As a rule, pneumothorax will disappear when the opening in the chest wall has been closed by the adjacent integumentary structures. These two facts have enabled surgeons, by means of tubes under water and the use of rubber tissue dressings, to allow for post-operative drainage of the thorax without artificial control of pneumothorax.

Technic of Intratracheal Insufflation Anesthesia.—Apparatus for intratracheal insufflation anesthesia has multiplied rapidly since the popularization of the method by Elsberg. However, all apparatus is similar in certain essentials. The source of air current may be provided by foot bellows, hand-driven or electrically-driven pumps, and tanks of compressed air. The air-current may pass directly into the ether container, or as is more advisable, is stored in a low-pressure tank or gasometer from which it passes into a Wolf bottle, to be heated and moistened, and thence by regulating valve, either directly into, or only partially through, the ether container, thereby providing for aeration pure and simple or insufflation with varying percentages of ether.

Also a source of oxygenation is an expedient adjunct. The tube from the apparatus connects with a mercury manometer and thence to the intubation tube.

Davies, adopting Kuhn's idea of a double intubation tube, uses a manometer to gauge the inlet and outlet air pressures.

All experimenters have concluded that for the Meltzer-Auer technic a silk-woven catheter 30 cm. long and of a diameter one-half that of the glottis, usually from 22 to 26 of the French scale, serves as the best intubation tube. It should have an opening similar to the rectal tube at the tracheal end, should be absolutely smooth and semi-rigid to prevent it from being expelled by coughing or from being compressed while in position.

Its introduction is best accomplished after the preliminary introduction of narcosis by ethyl chlorid-ether or nitrous oxid-oxygen-ether anesthesia.

Intubation is greatly facilitated by means of either the Jackson direct laryngoscope, Fischer's modification of Hayes's instrument, or the introducer devised by Cotton. After the patient has been deeply narcotized the mouth is opened wide

and so held by a gag. The head is well brought forward and the tongue pulled forward by an assistant until the opening of the larynx is brought into view. The metal guide is introduced into the opening and the intubation tube is gently pushed onward until it is seen to pass over the epiglottis into the larynx, after which the metal guide is withdrawn and the tube is pushed further into the trachea until it meets an obstruction, which is either the wall of the right bronchus or the bifurcation of the trachea. It is then withdrawn an inch and is anchored in position to special mouth gags provided for the purpose.

The distance from the incisors to the bifurcation of the trachea is from 9 to 10 inches in the infant, 12 in a child, and about 17 inches in the adult. The glottis in the adult is one-half the distance between the incisors and the bifurcation of the trachea, and Elsberg suggests making the intubation catheter accordingly to insure greater accuracy in adjusting its location.

One-eighth to $\frac{1}{4}$ gr. of morphine hypodermically ten minutes before the administration of ether to reduce the irritability of the larynx; or from twenty minutes to half an hour previously when preliminary anesthesia by ether is not resorted to. The induction of narcosis by intratracheal insufflation produces spasmodic coughing while the patient remains conscious.

With the intubation tube introduced to the correct position, air may be heard rushing through the catheter. Spasm of the larynx may now occur for a few moments, but is of no consequence. At this juncture the tube from the apparatus is connected to the catheter with the pressure gauge of the manometer controlling the air supply at 20 mm. and the ether percentage at 50. If the lungs are not kept properly distended by a pressure of from 10 to 20 mm. Hg, the intratracheal tube is either out of position in the right bronchus or is too small and is allowing too much air to escape by way of the trachea. In the first instance the tube must be retracted and in the second either a larger sized tube must be introduced or else slight compression of the trachea around the tube at the jugulum must be intermittently utilized. Too large a tube causes CO_2 accumulation and cyanosis.

Complete muscular relaxation is usually obtained with from 50 to 75 per cent. of ether, and during the course of narcosis the breathing is quiet, respirations are reduced by one-third, the face remains pink, while the veins of the forehead become prominent; the pulse usually remains full, bounding, and regular, the pupils do not dilate, and frequently the corneal reflex is active, so much so that

the condition of the patient is rather one of analgesia than anesthesia. Reaction from the anesthesia is so rapid that care must be exercised to keep up etherization throughout the entire operation. The depth of narcosis is controlled by increasing the air pressure and the percentage of ether while at the same time avoiding a condition of apnea, which supervenes at pressures of from 30 to 40 mm. Cyanosis and the accumulation of CO_2 during the operative procedure are controlled by periodic deflation and occasional oxygenation with air. Pure oxygen is dangerous on account of its toxicity when its tension becomes too great, and it is too freely absorbed by the circulation.

At the close of anesthesia, ether is turned off, and pure air, or a combination of air and oxygen, is insufflated under slightly increased pressure to blow out the ether from the trachea and alveoli. Patients come out from under the influence of pulmonary anesthesia by this method almost as soon as the insufflation is discontinued and the tracheal tube removed.

While etherization in association with intratracheal insufflation appears to be the safest form of anesthesia for intrathoracic operations, Boothby, after using the nitrous oxid-oxygen-ether technic, has been favorably impressed with the latter method and Willy Meyer also suggests that the innocuousness of nitrous oxid may play an important rôle in conserving patients under thoracotomy the additional shock of a poisonous anesthetic agent.

FOURTH AND BROADWAY.

DISCUSSION.

MAJOR ALLIE W. WILLIAMS, U. S. A., Medical Corps, Washington, D. C.—My interests as a military surgeon are so keen on the subject of intratracheal insufflation anesthesia that on being ordered to Vera Cruz, Mexico, with General Funston's expeditionary forces in April, 1914, I promptly packed up my portable intratracheal insufflation apparatus and loaded it onto the United States Army Transport Kilpatrick at Galveston. Thus my apparatus formed a part of the Army Field Hospital equipment at Vera Cruz.

Although it was a bloodless war after the first two or three days incident to the taking of Vera Cruz and as a consequence I did not have the opportunity to make as much use of my apparatus as had been anticipated. Still, one very interesting case fell to my lot while there. The case was that of a Mexican with a bronchial fistula. The first case I had ever seen. The anesthetic, ether, was administered by intratracheal insufflation, and though infection is the rule in operating on a fistulous opening into the mouth by way of the submaxillary gland, by this method of anesthesia I was able to so perfectly control asepsis that no infection occurred and the outcome was a good result.

There are one or two points in Dr. Ricketts' excellent paper I wish to emphasize, and they are, first, the safety of the anesthetic by intratracheal insufflation. After having found out the amount of ether necessary to the individual the desired depth of anesthesia can be maintained more accurately and unvaryingly by a machine than by hand. An infallible method of artificial respiration is immediately substitutive for the anesthetic if any untoward symptoms arise. With the respiratory system always under your control the action of the heart is practically your only concern. In particular I recall one case in that of a soldier with advanced pulmonary tuberculosis in which it would have been exceedingly hazardous to have depended upon his limited sound lung capacity for surviving an operation on his chest wall, with intratracheal insufflation this danger was absolutely eliminated. The machine did the breathing for him. My experience in the use of intratracheal insufflation anesthesia has been limited to the use of ether as the anesthetic agent.

It has been my observation that post operative nausea and vomiting is so frequently absent or so slight that it is almost a negligible factor. The absence of nausea and vomiting is explained by the blowing out of the lungs with fresh air after discontinuation of the anesthetic. The residual ether having been blown out of the air cells of the lung, the swallowing of heavily laden ether mucus does not result. Another feature of importance is the diminished shock due to absence of prolonged post-operative anesthesia, whereas by the mask method the post-operative anesthesia may be prolonged from one to three hours. In intratracheal insufflation coincident with the blowing out of the lungs with fresh air consciousness follows in a very short space of time.

In head, neck and chest surgery I feel that intratracheal insufflation anesthesia fills an indispensable place in the practice of surgery in hospitals in the military service.

American Journal of Surgery

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Cincinnati, Ohio, U.S.A.

OCTOBER

EDITORIALS.

1915

A REPREHENSIBLE PROPAGANDA AGAINST DENTAL ANESTHETISTS.

In the *Medical Times*, September, 1915, Lawrence Irwell, an attorney of Buffalo, N. Y., who for some years has been agitating the problem of the *non-medical anesthetist*, makes the following announcement:

"At the next session of the Legislature (1916) of this state (New York), an attempt will be made to obtain legislation which will provide that the administration of general anesthetics is a part of the practice of medicine. The proposed addition to the law, of which a copy is appended, will not interfere with the lawful rights of dentists, with the employment of any reliable person in an emergency, or with the instruction of medical or dental students. (?)

"A Bill to Regulate the Administration of General Anesthetics by Persons other than Licensed and Registered Physicians.

"The administration by any process of any substance, liquid or gas, commonly called a general anesthetic, for the purpose of producing unconsciousness, shall constitute the practice of medicine and surgery, even if undertaken in the presence of and by order of a licensed and registered physician, surgeon or dentist, with the following exceptions:

"1. A licensed and registered dentist may administer any general anesthetic for any operation which such a dentist can lawfully perform, but not for any operation which a dentist cannot lawfully perform, even if a licensed physician is present and directs such dentist to administer such general anesthetic, except as is herein-after provided.

"2. In any case of sudden severe illness or sickness in which the licensed physician or surgeon in attendance upon the patient conscientiously believes that the delay necessary to obtain the services of another licensed physician to administer a general anesthetic, will endanger the life or health of the patient, that attending physician or

surgeon may employ any reliable person to administer such general anesthetic in his presence and directly under his instructions, but not in his absence. The employment in this manner of any person other than a licensed and registered physician to administer any general anesthetic must be strictly limited to emergencies in which the services as anesthetist of a licensed or registered physician cannot be quickly and easily obtained, and must not be a regular or habitual practice.

"Nothing contained in this statute shall be construed to prohibit necessary practical instruction in the administration of general anesthetics being given to registered medical students by licensed physicians or to registered dental students by licensed dentists or licensed physicians; always provided that while giving such instruction, the instructor devotes his entire attention to teaching and neither operates nor does any medical, surgical or dental work unconnected with the administration of a general anesthetic."

The Editor of the SUPPLEMENT submits that this statute if passed as printed will not accomplish its purpose, but will involve dental and surgical anesthetists in a maze of difficulties. It is an entirely misguided and reprehensible propaganda.

While the SUPPLEMENT is making every effort to abolish the evils involved in the administrations of anesthetics by non-medical anesthetists, it cannot subscribe to the limitations this statute intends to place on the dental anesthetist, and it is hoped that dental associations in New York will give this matter their immediate attention.

The New York Society of Anesthetists welcomes dental anesthetists to its membership, as does the Interstate Association of Anesthetists. In fact, this latter association will have a special section of Dental Anesthetics on the program of its next meeting. Throughout the United States dentists are being gradually admitted into medical associations, and the barriers between the two professions are being obliterated, particularly in the section on Stomatology of the American Medical Association and the Academy of Stomatology, Philadelphia.

This effort to differentiate the respective prerogatives of dental and surgical anesthetists is reprehensible and in direct contravention to the spirit of amalgamating the interests of both professions, which is leavening the American professions of medicine and dentistry.

Section 2 of this statute simply leaves a loophole for future violations of the law; while the final paragraph in *editorial italics* shows how absurd a propaganda of reform may become under the lash of misguided enthusiasm. This section if strictly interpreted and enforced would utterly abolish *dental anesthetic clinics as they have been held for years in connection with state and national dental association meetings.*

Moreover, it would imperil the future of *analgesia*, as a technic of pain-alleviation, in which the surgeon or dentist both administers the anesthetic and operates, and *teaches.*

The utter absurdity of this section becomes the more apparent when it is realized that a similar statute similarly applied would abolish the clinical teaching of surgery.

Finally, the solution of the problems involved in the administration of anesthetics by non-medical anesthetists, lies within the powers of the various state medical boards. All they have to do is to test the legality of the procedure and discipline those licensed and registered physicians who persist in violating not only the medical practice acts of their respective states but the ethics of their state associations as well.—F. H. M.

THE SUPPLEMENT'S FIRST ANNIVERSARY.

It is with pardonable pride that the ANESTHESIA SUPPLEMENT, in completing its first year of existence, points to the fact that it is successfully fulfilling its editorial policy of *service*. With the close of the European conflict the SUPPLEMENT will add the Transactions of the Anesthetic Section of the Royal Society of Medicine, to the list of those already being published, and through the courtesy of their respective Secretaries, the SUPPLEMENT will also print an Abstract of the Proceedings of the Louisville and Indianapolis Societies of Anesthetists.

Further than this the SUPPLEMENT is supporting the activity of certain State Medical Boards in testing the legality of the administration of anesthetics by nurses. This problem now confronting the specialty of anesthesia gives promise of a speedy and favorable solution.

Pending a legal decision, pressure will be brought to bear upon important surgical associations to secure their cooperation in abolishing this abuse.
F. H. M.

CRUMBS FOR THE ANESTHETIST.

A situation has arisen with regard to the anesthetic service of the Cincinnati General Hospital, which deserves the attention of anesthetists throughout the country. The Cincinnati General Hospital is a municipal institution recently completed at an expense approximating *four million dollars*, and is closely affiliated with the University of Cincinnati as its Clinical School of Medicine. More recently a fund of *five hundred thousand dollars* has been subscribed to build a new Medical College Building on the grounds of the hospital.

From the foregoing it would appear that this institution could not only afford the services of a paid anesthetist, but could also make the salary

sufficiently attractive to invite applicants for the position.

During the past ten years several members of the INTERSTATE ASSOCIATION OF ANESTHETISTS have at various times acted as Visiting-Anesthetists to the Cincinnati General Hospital, *without recompense*. When the last incumbent resigned because the demands on his time and energy were precipitating him into financial bankruptcy on account of having to neglect his private practice, the municipality finally saw a light and decided to offer the munificent salary of from *fifty to seventy-five dollars* a month to any applicant who would pass the requisite civil service examination. The salary was in recompense for full time service, including the distinguished honor of punching a *time-clock*.

Fortunately the anesthetists of Cincinnati and its immediate vicinity were so busy making a decent, self-respecting living by administering anesthetics at other hospitals and for surgeons who appreciated the value of their services, that *not a single anesthetist* showed up to take the civil service examination for the position.

That the position is no sinecure, irrespective of the proffered salary, may be gleaned from the fact that the anesthetist holding down this service must accommodate himself and his methods to the idiosyncrasies of no less than 18 surgeons and specialists.

It is to be hoped that anesthetists will continue in their conviction that they are worthy of their hire, and that they will resent the medico-political economy that places them in the position of Lazarus, begging outside the gates, for crumbs from the table of Dives.
F. H. M.

REFUSAL TO SUBMIT TO ANESTHESIA AND OPERATION IN RESPECT TO WAR PENSIONS.

The following instructions of the Minister of War of France are of especial value to surgeons and anesthetists who are interested in the medico-legal phases of pensions and indemnifications under Workmen's Compensation Acts, as similar instances have already arisen and have been adjudicated in Continental and American Courts:

"The right to refuse a bloody operation, *with or without anesthesia*, is considered absolute in law and jurisprudence, because every bloody operation entails a risk of death. The exercise of this indisputable right of refusal, however, may entail certain consequences. The wounded man may have his final indemnification reduced, especially in the following two cases: (a) when the operation is very trifling and *does not require a general anesthesia* (incision of a superficial purulent collection, or extraction of an easily accessible bullet); (b) when an operation is urgent beyond all doubt, to avoid a complication capable of pro-

ducing an important or absolute incapacity (refusal to submit to the enucleation of a wounded eye in case of threatened sympathetic ophthalmia or to the amputation of a limb in gangrene). In such cases the physician should give the patient friendly advice that the operation offers the sole chance of survival or of minimum infirmity. He should suggest a consultation with one or several physicians, or, if necessary, the removal of the patient to a regional surgical center. If, notwithstanding, the patient persists in his refusal, the physician in charge of the case should draw up a report, giving exact data with regard to the proposed operation, its justification and the patient's refusal with his reasons. This report is to be signed by the patient, the physician in charge of the case and the physician-in-chief.

"With such a report before them, experts are to estimate on a fractional scale the degree which the operation might have reduced the total incapacity for work. When applications for retirement pension or for relief pension are passed on, the functional surplus incapacity caused by the failure to submit to treatment or operation is to be taken into account."

This subject was broached in the British Parliament some years ago and it was decided that it rested with the military surgeons to determine the fitness of a war-pensioner to submit to an operation under an anesthetic for amelioration of incapacity, and that a refusal to submit to the indicated surgery might imperil the continuance of the pension.

In *Shirt vs. The Calico Printers' Association, Ltd.*, tried under the Workmen's Compensation Act (England), a widow was awarded compensation for the death of her husband, who had submitted to a secondary operation for skin-grafting, under an anesthetic, to ameliorate his incapacity.

Similarly the Ohio State Industrial Commission, under provisions of the Workmen's Compensation Law, has on several occasions granted compensation to the dependents of those dying under operative procedures undertaken to ameliorate incapacity.

In *Bourne vs. The Middle Sussex Water Board* (England), it was held that the presence of Bright's Disease, corroborated by the medical experts and examiners which made any operative procedure under anesthesia an extra-hazardous risk, was sufficient legal grounds to establish the plaintiff in his legal rights in refusing operation for the amelioration of his incapacity.—F. H. M.

Book Reviews

A carefully selected library is essential to a thorough knowledge of the science and practice of a specialty.

Hand Book of Diseases of the Rectum. By LOUIS J. HIRSCHMAN, M.D., F.A.C.S., Fellow American Proctologic Society; Lecturer on Rectal Surgery and Clinical Professor of Proctology, Detroit College of Medicine. Octavo; cloth; 340 pages. *Second edition*, revised and rewritten, with 172 illustrations, mostly original, including 4 colored plates. C. V. MOSBY COMPANY, St. Louis, 1914.

Pursuant to the efforts of the American Proctologic Society and some of its individual members, the importance of a clear understanding of the diagnosis and treatment

of anorectal diseases has forced itself not only upon the average physicians, but also upon the faculties of medical colleges and universities, with the result that an increasing attention is being devoted to rectal diseases and courses in proctology are being rapidly established.

Hirschman has been a conspicuous figure in this propaganda, and the cordial reception given his *Hand Book* has necessitated a *second edition*. With an endeavor to make his work more valuable to the general practitioner and to the student, Hirschman has completely revised and rewritten his text. Operative technic has been simplified, new diagnostic methods added, the use of quinin and urea anesthesia described, the value of radiography in proctology illustrated by many plates, and numerous new illustrations, including colored plates, have been inserted to elucidate the text.

This volume is of especial interest to the surgeon, proctologist and anesthetist who are interested in the progress of local anesthesia in anorectal surgery. Speaking before the American Proctologic Society during its recent meeting in San Francisco, Hirschman said: "*In an experience covering several thousand cases of anorectal surgery and over two hundred cases of abdominal surgery performed under local anesthesia, the author, from the satisfactory results of his work, advocates the further employment of local anesthesia, not only in anorectal and intestinal surgery, but also in every phase of surgical activity in which unconsciousness of the patient is not a strict necessity.*"

In his *Hand Book*, after detailing the anatomy of the anorectal region, Hirschman discusses the symptomatology of rectal diseases, and gives valuable instructions regarding the various methods of procedure for examination of the patient for special pathological conditions. Succeeding chapters are devoted to concise and satisfactory expositions of such subjects as Constipation and Obstipation, Fecal Impaction, Pruritus Ani, Anal Fissure and Ulcer, Abscess, Fistula, Hemorrhoids, Proctitis, Sigmoiditis, Dysentery and Prolapse.

Those pages devoted to Local Anesthesia in the Treatment and Surgery of Anorectal Diseases are replete with valuable information regarding the anesthetic agents of choice, the instrumentarium, the general and special technics for routine and unusual procedures. Hirschman displays rare judgment in indicating the limitations of local anesthesia and the office treatment of certain conditions. While an enthusiast, he fully realizes that the use of local anesthesia has its contraindications.

Hirschman has a preference for eucain lactate in fractional percentage solutions, associated with quinin and urea hydrochlorid for prolonged obtunding effects. His routine use of the latter is well in accord with the success of Hertzler achieved in general surgery. He advises against the use of local anesthesia in all anorectal operations which require extensive dissection or over twenty minutes of time for their completion. While local anesthesia, associated with general narcosis, is always preferable for radical operations, local anesthesia alone is contraindicated by malignant, syphilitic or tubercular complications.

While Hirschman's volume does not assume the proportions of an exhaustive text-book, it serves the purpose for which it was written, and in the hands of a practical surgeon, specialist or anesthetist, provides all the vital information for making a diagnosis and all the technical details for successfully treating the conditions diagnosed. Further than this, it offers a thorough adaptation of the most improved methods of local anesthesia to the special surgery of proctology.

The Practical Medicine Series: Comprising Ten Volumes of the Year's Progress in Medicine and Surgery. CHARLES L. MIX, A.M., M.D., General Editor; GENERAL SURGERY (Volume II), Edited by JOHN B. MURPHY, M.D., F.R.C.S., Professor of Surgery in the Northwestern University. 602 pp., Index, and Profuse Textual and Plate Illustrations. THE YEAR BOOK PUBLISHERS, Chicago, 1915.

In reviewing the literature of the year (1914), Mix notes a pronounced reduction of the variety of routes for the administration of anesthesia and analgesia. Many who formerly advocated gas, local, spinal and intraneural

analgesias are returning to simple ether by the drop method, preceded by hypodermics of morphin and atropin. Even the use of scopolamin has materially diminished. The newer methods that are being advocated by their masters and are withstanding the test are the intravenous ether and saline of Kummell, the intratracheal method of Meltzer, and the ether-oil colonic method of Gwathmey, especially in operations about the face, neck and head.

Attention is drawn to Barton's use of colored ether and chloroform to obviate mistakes when both anesthetics are used in the same operation or are combined in the C. E. mixtures. Fairlie's investigations of blood-pressure under ether and chloroform are given the attention they deserve, and the investigations of Coburn on the increase in intoxication of ether by newer methods of administration are given in detail. Shipway's experiences with intratracheal anesthesia, based on 208 cases, are recorded, and the incidence of emphysema noted in the cases of Ehrlich, Luke and other observers.

The technic of Kummell's method of intravenous ether-saline anesthesia is given, as is also Gwathmey's technic of ether-oil colonic anesthesia. Attention is drawn to Coble's investigations regarding the production of poisonous aldehyds during vapor anesthesia, when an interrupted stream of ether-laden air is passed through any heating device above body temperature.

The incidence of after-pain following the use of local analgesia is touched upon in the observations of Honigmann, who suggests the preliminary use of morphin in all procedures that give promise of postoperative pain.

Flemming's statistics on the mortality under anesthetics are emphasized, and are already familiar to readers of the SUPPLEMENT, although a perusal of the original communication to the Anesthetic Section of the Royal Society of Medicine is really worth while.

Throughout the remainder of the volume, various methods of anesthesia and analgesia as they pertain to specific operative procedures are described and commented upon, and this feature of the PRACTICAL MEDICAL SERIES makes it exceptionally interesting to the specialist in anesthesia, who has become a vital member of an operating team, and should be conversant with the relation of the anesthesia or analgesia to any and all operative procedures.

Bodily Changes in Pain, Hunger, Fear and Rage.

An Account of Recent Researches into the Function of Emotional Excitement. By WALTER B. CANNON, Ph.D., George Higginson Professor of Physiology in Harvard University. 311 pp., with Textual Charts. Cloth. D. APPLETON & COMPANY, New York and London, 1915.

Recent important discoveries made by the author and his co-workers, de la Paz, Shohl, Wright, Washburn, Lyman, Nice, Gruber, Osgood, Gray and Mendenhall, are described in this book. Pain and the powerful emotions of fear and rage have been found to be accompanied by stoppage of digestion, the setting free of sugar in the body, the abolition of fatigue, the faster clotting of the blood, and by other fundamental changes all favorable to great feats of strength and endurance and to self-preservation in fierce struggle. The author discusses the relation of these emotional changes to the fighting instinct. After showing the inadequacy of modern warfare as a means of giving natural outlet to the activities for which emotions prepare, he suggests alternative satisfactions. So much for the physiological aspects of the subject.

This volume is of interest to the surgeon and anesthetist because the powerful emotions of pain, hunger, fear and rage play an active rôle in the morbidity of operative procedures under all forms of anesthesia and analgesia. Grile, Dolle and Austin, in working out the theory of anoci-association, made the researches of Cannon and his co-workers the basis of their investigations, and established a technic of surgical procedure that would eliminate the bodily changes which precipitated mortality after operations.

While not making the surgical application of his researches, even a cursory perusal of Cannon's book shows one the value of conserving the adrenalin content and

output of the body, and preventing operative glycosuria by the preoperative control of excitement and the post-operative elimination of pain. Also the clinical results of Gatch regarding posture and muscular relaxation as factors in shock, find a physiological basis in the explanation of Cannon that the integrity of muscle-tone is of vital significance in eliminating metabolic toxins, the accumulations of which precede relaxation and toxic complications.

The work is delightfully written, and although ultra-scientific, fascinates by the clearness and vividness with which the author expounds his theories, presents his researches and proves his conclusions.

Society Proceedings

Membership in a society devoted to your specialty is an essential to success.

AMERICAN PROCTOLOGIC SOCIETY.

The American Proctologic Society held its Seventeenth Annual Meeting at San Francisco, June 21 and 22, under the presidency of Dr. Louis J. Krouse, of Cincinnati.

In pursuance of its editorial policy of *service*, the SUPPLEMENT presents author's abstracts of the papers read at this meeting which were of especial interest to surgeons and anesthetists.

THE PRESENT STATUS OF LOCAL ANESTHESIA IN THE SURGERY OF THE LOWER BOWEL.

LOUIS J. HIRSCHMAN, M.D., F.A.C.S.,
Detroit, Mich.

In an experience covering several thousand cases of ano-rectal surgery and over two hundred cases of abdominal surgery performed under local anesthesia, the author from the satisfactory results of his work advocates the further employment of local anesthesia in not only rectal and intestinal surgery, but also in every branch of surgical activity where absolute unconsciousness of the patient is not a strict necessity.

Several essentials to be rigidly observed are: the surgeon's thorough familiarity with contraindications to local anesthesia, the patient's temperament, surgical surroundings, extent of operation, its probable duration, idiosyncrasy of patient, and psychic surroundings as governed by the surgeon himself, must be given serious consideration. The attitude and method of approach of the surgeon and assistants, their conversation and general handling of the case is fully as important as the selection of the anesthetic employed. While many operations can be performed successfully in one's office operating room or the patient's home, it is far better to operate in a modern hospital.

The preparation of the patient should be just as thorough as though general anesthesia was to be employed. It is the author's custom to administer fifteen to twenty grains of chlorotone with or without one-fourth grain of morphin with a hot drink an hour before operating. In abdominal cases one-fourth grain of morphin and one-hundredth grain scopolamin is administered hypodermically one-half hour before operating. The patient and the operating room attendants are kept as quiet as possible, success of the local anesthetic being entirely nullified by lack of attention to surrounding details. The operating room is fully prepared before the patient is brought in; instruments, utensils, etc., are kept out of sight and hearing of the patient, and a code of signs and signals used in asking for instruments, pads and other things. The table is covered with a thick pad or mattress, the patient's ears are stopped with cotton and a towel placed over the eyes. The patient is placed in the dorsal position if the operation is abdominal, and the arms placed at his sides, but not strapped or restrained in any way. The iodine skin sterilization is used and assistants and interns taught to constantly keep in mind that the patient is not asleep and all handling should be as gentle as possible. One-eighth of one per cent. solution of beta-eucain lactate is

used for skin anesthesia and a thirty cc. all-metal syringe armed with twenty-six gauge needle is used. The fascia, muscles and peritoneum along the line of incision are surrounded by an ellipse of one-half of one per cent. solution of quinin and urea. One point to remember is not to start the operation too quickly after injecting the anesthetic. Five minutes after eucain and ten to fifteen after the quinin solution should be the minimum wait. Under the proper technic the abdomen can be explored as satisfactorily as if the patient were asleep. By injecting the mesentery of the bowel retraction can be made painlessly. The author always places his colostomies in the median line, using the colotomy wound for the purpose, as it can be better controlled by the patient here than in the flank.

In ano-rectal surgery local anesthesia has reached a high stage of development and is now used in the author's practice in by far the majority of his cases. Practically every operation excepting dissecting of extensive fistulas and extirpation of strictures and cancer can be successfully performed by skilled rectal surgeons under local anesthesia.

The technic of hemorrhoidectomy will serve to illustrate local anesthesia in proctology:

With the patient in the left lateral position, anesthesia of the sphincter muscles is accomplished by blocking the posterior sphincterian nerves at the junction of posterior and middle thirds of the anus. The anterior nerves are anesthetized in like manner. The entire anal circumference is injected from these anesthetized areas. The external hemorrhoids are distended to a waxy white color, pressure anesthesia accomplishing more than chemical strength of anesthetic. After four or five minutes' wait the injected skin is grasped at the four points of the compass with Pennington triangular forceps. Traction of these forceps everts the anus and prolapses the hemorrhoids.

This may be assisted by expulsive efforts on the patient's part. The hemorrhoids, starting with the most dependent one, are anesthetized by distension with one-half of one per cent. quinin and urea solution. After a wait of ten minutes the operation can be started. Note that the use of rectal speculum or dilating the sphincter is not mentioned. If properly anesthetized, the sphincter relaxes without any effort to dilate, and the four everting forceps expose the operative field in a most satisfactory manner.

In the author's operation the hemorrhoid is seized with the Hirschman forceps in its long axis and a chromic ligature passed into, underneath and around the hemorrhoid at its junction with the healthy mucosa, a curved blunt ligature carrier being used. The ligature is tied securely, leaving one end fourteen and the other five inches long. All hemorrhoids are treated likewise, thus reducing the operative hemorrhage to a minimum. The hemorrhoids are then excised from without with curved scissors, care being taken to remove as much hemorrhoid with as little mucosa as possible. Any varicosities presenting in the wound are carefully excised down to the sphincter muscles. The long end of the ligature threaded into a small, round, curved needle is used to close the wound. It is then tied to the short end and is used more for hemostasis than for coaptation. After all the hemorrhoids are treated likewise, quinin and urea solution is injected under the suture lines for post-operative anesthesia.

The operative treatment of many other diseased conditions of this region can be just as successfully performed under local anesthesia as the types of surgical operations described above.

Among these may be mentioned abscesses, prolapse of the anus or rectum up to the second degree, the removal of polyps, hypertrophied anal papillae, the excision of diseased Morgagnian crypts, the section of hypertrophied rectal valves, the removal of foreign bodies and impactions, Krouse's modification of Ball's operation for pruritus, and many others.

The principles to be observed in all surgical operations under local anesthesia are the conservation of the patient's peace of mind, the prevention of unnecessary pain, both operative and post-operative, the lessening of anes-

thetic shock, prevention of post-operative pneumonia and nephritis, the shortening of the period of hospital confinement and detention from daily activities, the simplification of surgical technic and detail, the constant reiteration, both in precept and in action, that *the patient is the most important thing to be considered in any surgical operation*, and the use of local anesthesia teaches the surgeon to perform every operation with the least handling and injury to the tissues. What he is forced to do in operating under local anesthesia, he becomes accustomed to do under general anesthesia.

The thousands upon thousands of patients who have been successfully treated surgically under local anesthesia, not only in entero-proctology, but in other branches of surgery, offer the best testimony as to the value, efficacy and success of the use of local anesthesia.

THE PANAMA-PACIFIC DENTAL CONGRESS.

The Panama-Pacific Dental Congress met in San Francisco August 30 to September 9, 1915, under the presidency of Dr. Frank L. Platt, and the following papers of interest to dental anesthetists were presented: "Anoci-Association in Dental Operations," Dr. R. H. Riethmuller, Philadelphia, Pa., and "Peridental Anesthesia-Intraosseous Method," Dr. Frank L. Platt, San Francisco, Cal. The SUPPLEMENT presents herewith abstracts of these papers.

ANOCI-ASSOCIATION IN DENTAL OPERATIONS.

RICHARD H. RIETHMULLER, Ph.D., D.D.S.,
Philadelphia, Pa.

Today the anomalous situation that, though dentistry has discovered and perfected to a high degree the technic of nitrous oxid-oxygen anesthesia, many of its disciples after a perfunctory trial have abandoned its practice, and without anything like just grounds have condemned it wholesale, while their condemnations in reality are nothing more nor less than a confession of inefficiency and lack of close application. Thus while in the dental profession many are deprecating the value of nitrous oxid anesthesia in surgery, such men as Crile and Lower have welded the method with that of local anesthesia into a new technic of *anoci-association*.

In justice, however, it should be said that a few members of the dental profession have labored industriously to perfect and safeguard for dentistry the remarkable aid which, in every sense of the word, is dentistry's own merit. Experiments are under way as to the effects of nitrous oxid on blood-pressure, on the chemistry of the blood, on respiration and the secretory organs, being conducted notably by the investigators working under the auspices of the class of anesthesia of the Academy of Stomatology of Philadelphia, and some very striking data are being reported. But it can hardly be asserted that the profession at large has lent its due share of support by closely observing and reporting the effects of nitrous oxid alone or in combination with other anesthetics, upon the respiration, circulation, metabolism and psyche of patients of all ages and conditions of health. Here is a most fertile field for that earnest co-operation of the practical with the theoretical man, which is being more and more generally urged.

Every individual is a cosmos in himself and demands a painstaking selection and modification of the anesthetic means particularly suitable for his, and *only his*, case. Personal, physical, emotional, traditional, environmental, racial, climatic and many other factors and their particular mixture in each patient determine the selection of the anesthetic method of choice or its modification to meet individual requirements.

Nitrous oxid-oxygen anesthesia may be indisputably considered the safest general anesthetic, and combined with local anesthesia and the other elements that go to make up the newer concept of *anoci-association*, is by far the pleasantest and most satisfactory method of alleviating operative pain and postoperative distress.

Anoci-association is based on Crile's *kinetic theory of shock*, which holds that fear, worry, physical injury, infection, hemorrhage, excessive muscular activity, starvation and insomnia, to say nothing of pain, produce alterations in the cellular elements of the brain, suprarenals and

liver, resulting, if not counteracted, in a disintegration of these cellular elements. Now the brain, adrenals and liver may be protected from noxious impulses by the use of nitrous oxid-oxygen anesthesia, which is the least destructive form of anesthetic, coupled with local anesthesia and certain pre- and postoperative precautions. While the application of anoci-association in accordance with its surgical technic is too complicated for average dental operations, yet the technic suggests many means by which the shock and distress of dental operations may be obviated.

Aside from a strict attention to the comfort of the patient in the dental chair, and a general fastidiousness about cleanliness of person, instrumentarium, etc., a painstaking knowledge of the technic and possibilities of nitrous oxid-oxygen anesthesia is an essential detail and should be acquired by persistent and consistent study of all the problems involved.

The preliminary use of bromural, chloral hydrate, camphorated validol, or morphin and scopolamin, are sedative measures required in all cases in which nervous, high-strung and sensitive patients present themselves for dental operations. Alcoholics and muscular individuals especially require the use of powerful sedatives.

While a combination of general and local anesthesia may be necessary in graver dental operations, anoci-association methods are possible with local anesthesia alone, provided attention is paid to details, such as the proper psychic preparation of the patient, the use of preliminary sedatives, the painless insertion of the needle and delicate manipulation of all instruments and the tissues operated upon. Conductive anesthesia will enable the dentist to use anoci-association in the presence of acute inflammatory and other pathological conditions, in which direct obtunding of the operative field would be impossible without unendurable pain.

However, only a thorough mastery of its technic, coupled with an appreciation of the importance of correct isotonia, dosage, temperature and sterility of solutions, and the strictest adherence to asepsis in every phase of the operative procedure will lead to successful results.

Should light symptoms of collapse appear, such as pallor, nausea, palpitation, rapid pulse, perspiration or trembling, a decoction of black coffee, aromatic spirits of ammonia or camphorated validol may be advantageously given. The inhalation of amyl nitrite, placing the patient in a recumbent position, heart stimulation by the hypodermic injection of camphor in oil, inhalation of oxygen and artificial respiration, must be resorted to in proportion to the gravity of the symptoms arising and the response to restorative measures.

Postoperatively, a painless and rapid process of repair is best assured by protecting wounds against external stimuli and irritation of the traumatized tissues by spraying or tamponing with pure orthoform or novocain powder, according to the method of Spiess, after previous antiseptic dressings with 10 per cent. iodoform or eucrophen. No inflammation will develop if the reflexes conveyed by way of the afferent nerves from the traumatized area by way of the afferent sensory nerves are successfully blocked by anesthesia, and the normal function of the vasomotor nerves is not interfered with. Internally, the administration of trigenin, pyramidon, aspirin or combinations of these sedatives will render excellent service in preventing post-operative shock and allaying after-pain.

PERIDONTAL ANESTHESIA-INTRAOSSEOUS METHOD.

FRANK L. PLATT, D.D.S.,
San Francisco, Cal.

Peridental anesthesia is valuable in obtunding teeth or roots standing singly, or teeth affected by pyorrhea or similar chronic peridental disturbances. Anesthesia is accomplished by injecting the analgesic agent directly into the peridental membrane. In single-rooted teeth a fine and short hypodermic needle is inserted under the free margin of the gum, or through the interdental papilla, into the peridental membrane between the tooth and the alveolar wall. Occasionally the needle may be forced through the thin alveolar bone so as to reach the peridental membrane direct.

In teeth set close together, separation is essential to

gain access to this membrane. This may be readily accomplished with an orange wood stick or by any of the mechanical separators. By this means the body of the tooth is shifted to one side, and in the slight space between it and the alveolar process there is room sufficient to introduce the hypodermic needle. The injection is now made directly into the exposed peridental membrane. By reversing the separator, the tooth is shifted to the other side and the injected analgesic is forced toward the apex of the tooth. A second injection is now made into this freshly exposed portion of the peridental membrane. It usually requires a higher pressure to inject the analgesic into the peridental membrane than into the periosteum covering the alveolar process, but the quantity of the anesthetic solution required is less. Peridental anesthesia is the purest form of local anesthesia, since the seat of the nerve supply of the tooth is very quickly and almost directly reached, and consequently the results obtained are extremely satisfactory. The method is available for the removal of pulps in such cases in which contact anesthesia is not indicated or for temporarily obtunding a tooth for operative procedures. The method is contraindicated in the presence of acute inflammatory conditions of the peridental membrane.

The intraosseous method of peridental anesthesia was introduced by Otte in 1896, and consists in forcing the anesthetic solution directly into the spongy cancellous bone. The technic of injection is as follows: After the gum tissue is thoroughly cleansed with an antiseptic solution, it is anesthetized about the neck of the tooth in the usual manner. After waiting two or three minutes an opening is made into the gum tissue and the bone on the buccal side with a fine spear or Gates-Gidden drill. The opening is preferably made at a right angle with the long axis of the tooth, a trifle below the apical foramen in silge rooted teeth, and between the bifurcation in the molars. The right angle hand-piece of the drill is employed for this purpose. The drill must be of the same gauge as the hypodermic needle. The gum fold is tightly stretched to avoid laceration from the rapidly revolving drill.

As soon as the alveolar process is penetrated, a peculiar sensation to the guiding hand indicates that the alveolus proper has been reached. The drill is now withdrawn and the hypodermic needle substituted and the injection made in the ordinary way. Only a small quantity of the anesthetic solution is required. The roots of the teeth are imbedded in a sieve-like mass of bone, the diploe, which permits a ready penetration of the fluid when injected under pressure.

More recently Masselink has advocated this method of anesthesia for obtunding any tooth in the mouth for the purpose of extracting or the removal of its pulp. A No. 1/2 round burr is employed for penetrating the alveolar plate, and a short (1-16 inch) needle with a dull point is used for the injection.

AMERICAN ASSOCIATION OF ANESTHETISTS.

The Third Annual Meeting of the American Association of Anesthetists was called to order in Hall D of the Civic Auditorium, San Francisco, Cal., at 9.30 on the morning of June 21, 1915, with President Dr. Charles K. Teter, of Cleveland, O., in the chair. The minutes of the previous meeting at Atlantic City were accepted as read by the Secretary, Dr. James T. Gwathmey.

Following a precedent established by the Association, only applicants to membership who had a medical degree were elected to Fellowship. Exception had been made in the past in electing several dentists to Fellowships and important offices, but these honors had been conferred on account of outstanding work in the advancement of anesthesia. The applicants were elected to Fellowship by a ballot cast by the Secretary for the Association.

Upon motion of Dr. Botsford, the Secretary cast the ballot of the Association for the unanimous election of the following nominated officers: President, Dr. Willis D. Gatch, Indianapolis, Ind.; Vice-Presidents, Dr. Walter M. Boothby, Boston, Mass.; Dr. F. W. Nagel, Montreal, Canada, and Dr. Isabella C. Herb, Chicago, Ill.; Secretary-Treasurer, Dr. James T. Gwathmey, New York City; Members of the Executive Committee, Dr. Albert H.

Miller, Providence, R. I., and Dr. Paul Lux, Kansas City, Mo.

While Dr. Willis D. Gatch, the newly elected President, is not an active anesthetist, but Professor of Surgery in the University of Indiana Medical School, he was nominated and elected to this position on account of his researches in the theory and practice of anesthesia, and in compliment to his activities in behalf of the American and other associations of anesthetists.

After some discussion Article III of the Constitution, upon motion of Dr. E. I. McKesson, was amended so that while qualifications for membership remain the same, no limitation of number will restrict the Association in increasing its membership.

The report of the Treasurer was accepted as read.

During the two scientific sessions the following papers were read and discussed: President's Address: Nitrous Oxid-Oxygen Anesthesia in Obstetrics, Dr. Charles K. Teter, Cleveland, O.; Nitrous Oxid-Oxygen Anesthesia, Dr. Mary E. Botsford, San Francisco, Cal.; Color Changes and the Margin of Safety in Nitrous Oxid Anesthesia, Dr. Douglas H. Morse, Pomona Valley, Cal.; Blood-Pressure Under General Anesthesia, Dr. E. I. McKesson, Toledo, O.; Use of Colloidal (Gelatin) Solution in Low Blood Pressure, Dr. James J. Hogan, San Francisco, Cal.; Personal Experiences with Anoci-Association, Dr. Wallace Irving Terry, San Francisco, Cal.; Some Basic Principles of General Anesthesia, Dr. Carl G. Parsons, Denver, Colo.; The Rate of Evaporation of Ether from Oil-Ether Mixtures and Its Relation to Colonic Anesthesia, Prof. Charles Baskerville, New York City; Sacral Analgesia for Operations on the Sigmoid and Colon, Dr. Jerome T. Lynch, New York City; Factors Other than Anesthetic Causing Danger in Anesthesia, Dr. F. D. Bullard, Los Angeles, Cal.; Ether as an Antidote to Cocain and Novocain, Dr. J. E. Engstad, Minneapolis, Minn.; Some Features in the Evolution of Modern Anesthesia, Dr. Roland E. Skeel, Cleveland, O.; The Importance of Raising the General Standard of Anesthesia, Dr. Mary V. Madigan, Portland, Oregon; Ventricular Fibrillation as a Factor in the Causation of Chloroform Syncope, Dr. Edward H. Embley, Melbourne, Australia; Anesthesia in Status Lymphaticus, Dr. J. Margaret Roberts, Los Angeles, Cal.; Accidents During and Following Anesthesia, Dr. Isabella C. Herb, Chicago, Ill.; Apparatus for Pharyngeal Anesthesia for Nose and Throat Surgery was presented by Dr. A. E. Rokey, Portland, Ore.; an Apparatus for Intratracheal Anesthesia was presented by Dr. Saxton Temple Pope, San Francisco, Cal.; and a new Apparatus for Vapor Anesthesia and Resuscitation was presented by Dr. James T. Gwathmey, New York City.

The Transactions will be published in full in the SUPPLEMENT.

A banquet at the St. Francis Hotel, to which the ladies in attendance were welcomed, completed the meeting. In accordance with the custom of the Association, the next meeting will be held in Detroit, Mich., just prior to that of the American Medical Association.

Newer Apparatus

Editor's Note: From time to time this Department will publish Illustrations and Technical Details of the Newer Apparatus for Anesthesia and Analgesia.

AN APPARATUS FOR VAPOR ANESTHESIA AND RESUSCITATION.*

JAMES TAYLOR GWATHMEY, M.D.,
New York City.

The need for an inexpensive portable apparatus for endo-tracheal and ether vapor anesthesia resulted in this apparatus. The complete apparatus exclusive of carrying case weighs less than fifteen pounds. It is 16 inches long, 8½ inches deep and 5¼ inches wide.

* Presented during the Third Annual Meeting of the American Association of Anesthetists in San Francisco, June 21, 1915.

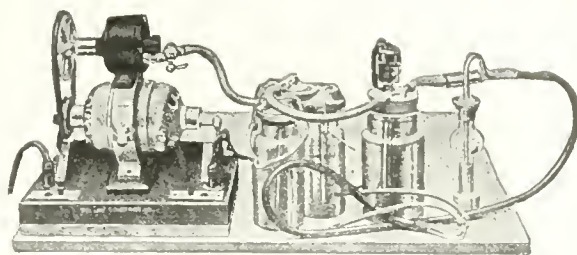


Fig. 1.

Fig. 1 represents the apparatus assembled for endotracheal or endo-pharyngeal anesthesia. It consists of four units: (1) motor, blower and rheostat; (2) the ether container; (3) a mercurial manometer registering from five to fifty millimeters, which can be instantly set for the pressure required for any operation and acts thereafter automatically; (4) an electric hot water heater for adding both heat and moisture to the vapor. A valve placed just outside of the heater automatically closes if back-pressure ensues at any time, thus throwing the pressure upon the manometer, which acts instantly. The lungs are collapsed by turning the handle of the two-way stop-cock on the rotary pump back and forth two to four times a minute.

Elsberg relates an accident which occurred in using an apparatus evidently similar to the three-bottle vapor inhaler by the anesthetist attaching the tube from the pump to the outlet instead of the inlet, thereby pumping pure ether vapor into the lungs of the patient. This accident cannot possibly occur with this apparatus, as all of the ether would be pumped first into the water bottle of the three-bottle vapor inhaler and then into the hot water heater, so even if such a mistake occurred, it would be almost impossible to pump pure ether into the patient's lungs.

This apparatus will do the same work as another occupying three times the space in the operating room.

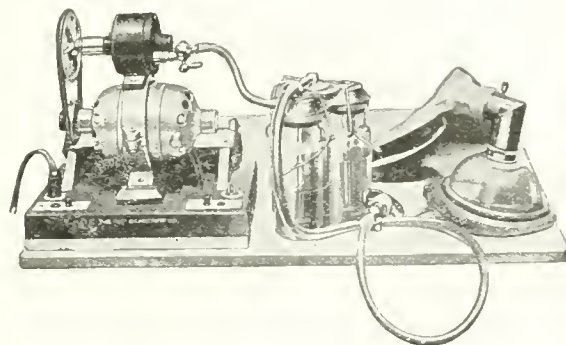


Fig. 2.

Fig. 2. The apparatus is assembled for the closed ether method, with the re-breathing bag so close to the patient's mouth that the ether vapor is warmed by the patient. The initiatory anesthesia may be made in any of the usual ways and continued with the closed vapor method.

Restrictions placed upon the closed method by laboratory workers and others do not pertain to ether when given in this way. The patient is sufficiently oxidized at all times and acidosis is impossible. A continuous supply of ether vapor, continuous re-breathing and a constant escape of part of the re-breathed air takes place. The method of anesthesia recommended is the Woolsey-orange-ether sequence.

The technic is as follows: The water bottle (under place marked *air* on the index) of the ether container is filled with three ounces of water in which are placed one to two drams of the Oil of Orange (25 per cent. Oil of Bitter Orange Peel, 75 per cent. of alcohol). Four to six drams of ether are placed in the small chloroform bottle. Chloroform should not be used with this apparatus at any time. Four ounces of ether are placed in the ether bottle. The index of the three-bottle vapor inhaler is turned to

air, and the bag is filled with the air pumped through the water bottle which contains the Oil of Orange. The mask is placed upon the patient's face and the patient breathes back and forth into the bag. The motor is started and sufficient air is pumped to keep the bag over two-thirds full at all times. The index is gradually turned toward *chloroform*, the receptacle in which four to six drams of ether have been placed. The patient is now getting a very small amount of ether which is apparently imperceptible. The index gradually is turned to full *chloroform*, the patient getting more and more of the mild, attenuated ether vapor. If at this time the patient coughs, sneezes, or swallows, or shows in any way that he perceives the ether, the index is immediately turned back to *air*. The same procedure is repeated until the index reaches full *chloroform*. The patient will now be found to be in a state of full surgical anesthesia, the average time required to reach this stage being four to six minutes. When this is accomplished the index is turned back to *air* again and gradually turned toward *ether*. Anesthesia is maintained with the index turned from one-eighth to one-quarter of an inch from *air*, but between *air* and *ether*, the percentage being regulated according to the patient's condition. The expiratory valve is at all times slightly open. The bag remains moderately distended, a slight positive pressure being a decided advantage in some cases, the expiratory valve permitting a continuous but small escape of air.

The breathing with this form of anesthesia is quiet and regular, approximating the breathing in chloroform anesthesia more nearly than that usually seen with ether. The lid reflex is absent, the eyeballs are rolling, but the patient is sufficiently relaxed for all surgical operations. The usual amount of ether used with this method is two or three ounces for the first hour and one ounce for the second. The patient goes under in practically the same way as with a good nitrous oxid-ether sequence. There is no struggling or other indications of a second stage. The pulse is normal, the color reflex unusually good. Woolsey has given over 500 anesthetics with this method.

Regardless of the method of induction, the technic for maintaining anesthesia with the closed method will be the same as that just outlined.

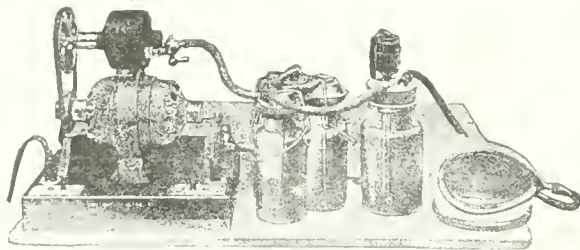


Fig. 3.

Fig. 3. The apparatus is now assembled for pharyngeal insufflation or the semi-open mask method. Again the induction may be in any of the various ways. My own preference for the induction for the open method is the essence of orange-chloroform-ether sequence, the technic of which is as follows: With morphin or some other hypnotic as a preliminary, place two to six drops of the alcoholic solution of oil of bitter orange peel upon the vapor mask, this mask being encircled with a towel. The drop method of chloroform will now proceed to the second stage. When this is reached, give one drop of ether every fifteen seconds for one minute or more, according to the condition of the patient, then alternate the drops of ether with chloroform and finally, as the third stage is reached, continue with ether. This is a very safe way to induce anesthesia, for the reason that the struggling stage does not occur when careful attention is given to the small details. As soon as the patient is under the drop method, the motor is started and the handle of the index gradually turned between *air* and *ether* as just described for the closed method. With the index handle about one-third of an inch from *air*, anesthesia is easily maintained. The index handle will be varied very slightly according to the way in which the patient responds to the ether vapor.

The reason for not inducing anesthesia with the *ether* vapor (for the open or semi-open method) is that it takes

too long a time to get the patient under, and there is usually a second stage. The vapor is sufficiently strong to hold any patient, after surgical anesthesia is established.

Electric Heater: The question as to whether or not ether can be heated is now past the controversial stage. There are many ways of heating the ether vapor, but the hot water seems to be the preferable, inasmuch as moisture is added to the heat. Brüning has made very careful experiments in regard to moisture, his conclusions being that when the moisture is below forty per cent, or above one hundred per cent, it is harmful, and suggests fifty to eighty per cent as the required amount. Thermometers and humidors might be added to this apparatus, which would make it very exact, but also quite complicated, thus defeating the object for which this apparatus was designed. Experience with a large number of cases has shown that for practical purposes the heat may be regulated as follows: With water in the hot water heater just above the shoulder of the metal electric heater, the heat is turned on by pressing the electric button. The water will be seen to boil and bubble around the metal heater in one-half to two minutes (according to the original temperature of the water placed in the container). When this occurs, the heat is turned off. It will be found that the ether vapor after passing over this water is warm (it should never be hot) to the sense of touch at the end of the rubber tube to which the mask is attached. It will continue warm for ten to fifteen minutes, when the electric button is again touched and left on for a half minute, when it is turned off again. In this way the heat of the ether vapor is easily regulated.

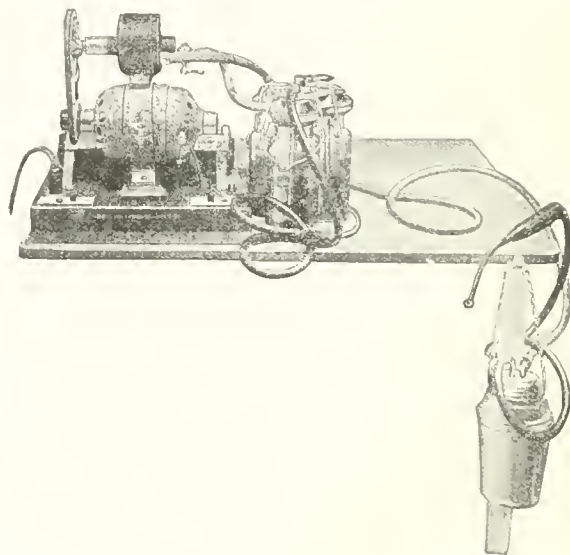


Fig. 4.

The fact that it takes twice as long to kill an animal with warm ether vapor as with cold, is sufficient reason for recommending it when using the open and semi-open methods. Again, in an experience of many thousand cases, two cases in which ether pneumonia occurred, no method of heating the ether was used. Furthermore, the patients come out of the anesthetic much quicker, and seem to be in much better general physical condition in every way when the ether is slightly warmed.

Joss finds that ether cools the air inhaled 33 to 44 degrees below the temperature of the room. The cooled air undoubtedly lowers the resisting powers of the cilia of the ciliated epithelium lining the upper air passages, when these passages become chilled. Infection is more liable to find its way into the finer air passages, as salivation increases under the chilled anesthetic.

There are many others, but these are sufficient reasons for advocating the warmed ether vapor in preference to the cold. The semi-open vapor method will appeal strongly to those surgeons accustomed to the open drop method. No human hand can deliver as even an ether vapor as an electric motor used in this way.

Fig. 4 Here the apparatus is especially arranged for adenoid and tonsil work with the suction apparatus added. The patient must be in deep surgical anesthesia before the pharyngeal or mouth tube is placed in position. The motor must be speeded up by pushing the button on the rheostat two-thirds the distance from the weak end. The small chloroform bottle is discarded and both the ether and chloroform bottles filled with ether. Some patients, as a child under four years of age, can be carried with the attenuated vapor when the index is turned somewhere between air and chloroform. When a stronger ether vapor is indicated, the index is placed between air and ether. When a still stronger vapor is indicated, the index is turned between chloroform and ether, thus drawing from both bottles. Care must be taken not to leave this last mentioned vapor on too long; as soon as the desired depth of anesthesia is reached, it can be maintained by turning back and getting the ether supply from the bottle required.

The Suction Apparatus: It will be found that sufficient suction is usually available without any further manipulation. The suction tip placed in the throat will prevent any blood from being swallowed, and the patient usually comes out in much better condition and with less nausea and vomiting than when this procedure is omitted. If strong suction is required, the double airway valve on the rotary pump (to which a tube is attached that conducts the air to the ether container) is used. The handle of this valve is turned so that all of the air goes into the room instead of through the ether container. It will be found that the suction is thus doubled. The handle may then be turned back. During the time that the strong suction is in use the patient will not be getting ether vapor, but as this strong suction is only used for one-half to one minute it will not interfere with the narcosis; for instance, immediately after excision of a tonsil, the strong suction is used which prevents any blood whatever from going in the throat; it is then turned back again. Again, immediately after the adenoids are removed, the suction is again turned on for thirty to forty seconds, and if a continuation of the anesthesia is not demanded from some unusual bleeding from the tonsils, it is continued to the end of the operation. The same technic would apply in any nose and throat operation, such as excision of the tongue, etc. In these longer operations, however, the electric heater should be used.

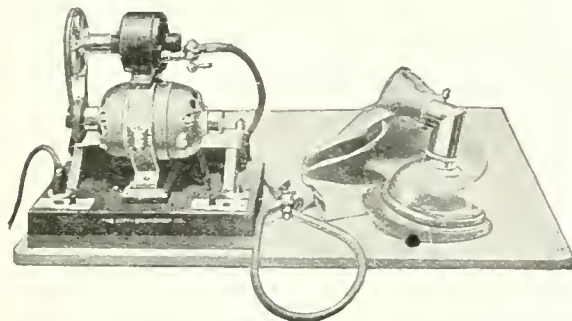


Fig. 5.

Fig 5. Assembled in this way the apparatus is used for resuscitation. It can be carried to the bedside and used wherever an electric attachment is available. The technic is as follows: Place a tightly fitting mask over the patient's face and push the button on the rheostat two-thirds or to the extreme strong end of the rod. Allow the rubber bag to fill to slight over-pressure; it will be found now that the patient's lungs are expanded. Turn the obturator on the chimney piece so that the air from the patient's lungs will escape into the room. Then turn back again so that the air from the bag will again fill the patient's lungs. Repeat this fifteen times a minute.

When the apparatus is assembled for intra-tracheal anesthesia, and resuscitation is attempted intra-tracheally, the patient's lungs may be expanded and collapsed by simply turning the handle of the two-way stop-cock on the pump back and forth as required.

The Ether Container (See Figs. 1, 2, 3 and 4): This

container has been used since 1905. By turning the handle of the stop-cock, which is the indicator, any desired percentage of ether vapor is secured. The reason for using this container in preference to the drop method or merely passing the air over the ether, is that we get a purer ether vapor than otherwise. Baskerville, after passing ether vapor through the water in the bottle of the three-bottle container, and collecting the ether distillate obtained under these conditions, found that it gave a negative reaction for aldehyd. He stated: "The aldehyd content of the ether passed through is considerably diminished and its toxic value is especially lessened when the water is kept at a temperature in the neighborhood of 60° c.

The total amount of ether used in any given operation is quickly ascertained. The percentage of ether necessary to maintain anesthesia is readily calculated by the bead in the ether bottle. But the patient is the principal index in all anesthetics.

The volume of air is easily regulated by the rheostat.

The suction or collapse of the lung is regulated by the two-way stop-cock on the rotary pump.

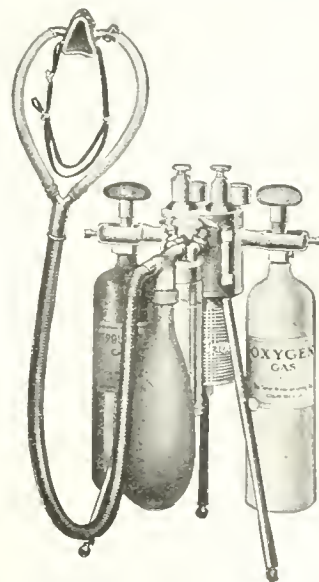
The amount of ether is regulated by the index handle on the ether container. The ether vapor is then moistened and heated as already indicated. It will be found that under these conditions a patient's pulse, respiration, temperature, reflexes and color index will more nearly approach the ideal than any present method for giving inhalation anesthesia. To a superficial observer these may seem minor and unimportant details, but results amply justify their combined use.

AN APPARATUS FOR NITROUS OXID-OXYGEN ANALGESIA IN OBSTETRICS*

CHAS. K. TETER, D.D.S.,
Cleveland, O.

This apparatus is portable and provides a yoke for one cylinder each of nitrous oxid and oxygen. The gases passing from these are reduced by means of pressure reducing valves, surrounded by a hot water heating appliance, from which the gases are led into a sight-feed controlled by separate valve for each.

The following advantages are presented: (1) the nitrous oxid and oxygen are reduced from high to low pressure as they flow from the cylinders; (2) the operator is enabled to secure accuracy of dosage as well as accuracy of control of the air supply through the nasal inhaler; (3) freezing up of the nitrous oxid is eliminated by means of a specially designed hot water chamber surrounding the reducing valves; and (4) the sight-feed



*Presented during the Third Annual Meeting of the American Association of Anesthetists, San Francisco, June 21, 1915.

enables the obstetrician or anesthetist to accurately gauge the amount of gas delivered to the patient.

The nasal inhaler is adjustable to any face and is held in place by retention straps. It is also provided with valves to allow the admixture of air if desired.

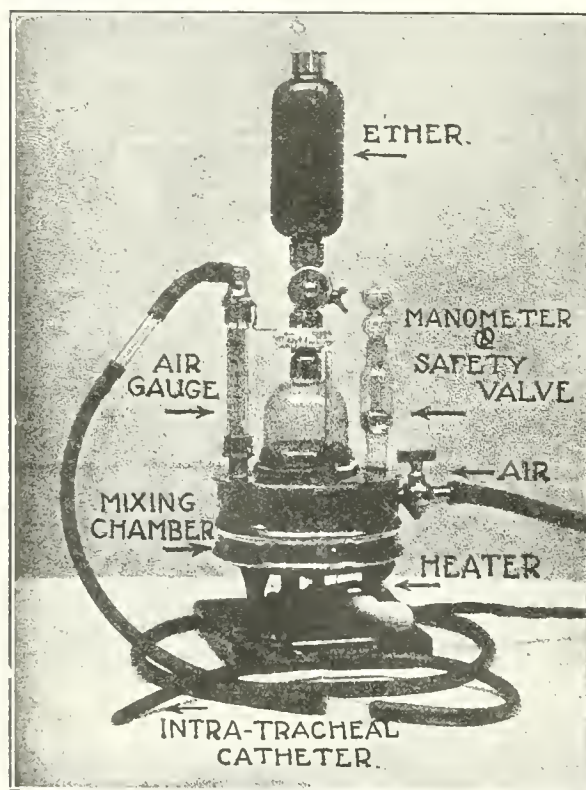
APPARATUS FOR PHARYNGEAL AND INTRA-TRACHEAL ANESTHESIA.*

SAXTON TEMPLE POPE, M.D.,

Instructor in Surgery, College of Medicine, University of California, San Francisco, Cal.

This apparatus is so constructed that its mixing chamber rests on an electric heater controlled by a switch and rheostat. It receives a constant stream of air from a Columbia dental air pressor driven by a small motor. The ether dropper above the mixing chamber permits very accurate dosage in drops of ether per minute.

A safety valve and manometer combined prevent accidental overpressure and register it in mm. of Hg. A floating pin wheel in the exit tube indicates the volume of air passing per minute, while a thermometer entering the mixing chamber indicates the warmth of the air-ether mixture.

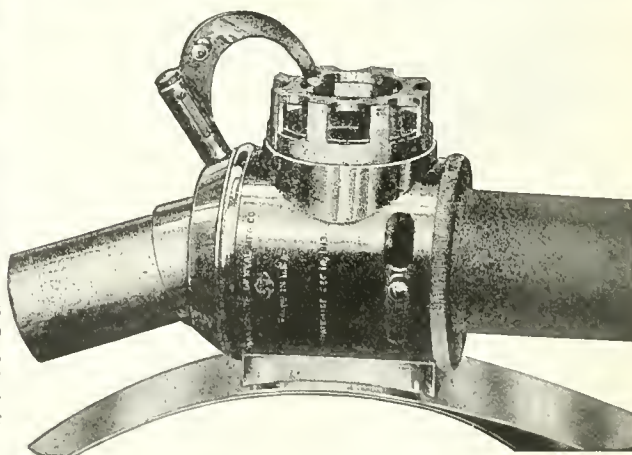
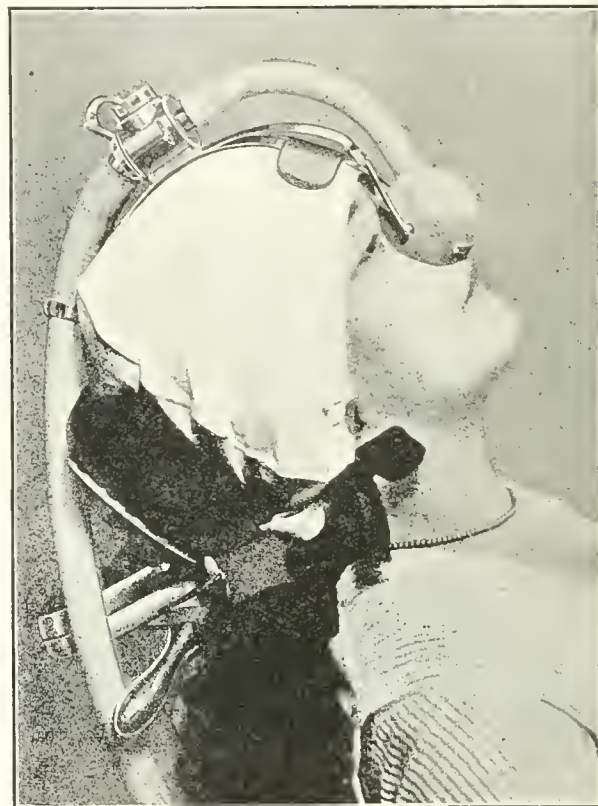


With these features a very accurate and safe anesthesia may be administered either by means of pharyngeal or intra-tracheal insufflation. This particular apparatus has been in use at the University Hospital during the past two years and has made possible operations in the open thorax, as well as having been of very material service in the surgery of the head and neck. It was developed experimentally in the laboratories of Surgical Research, College of Medicine, University of California

A NEW NASAL INHALER FOR NITROUS OXID-OXYGEN ANESTHESIA AND ANALGESIA.

The essential feature of the S. S. White Nasal Inhaler is a soft rubber nose-piece with rounded edge, adjustable to any form or size of nose with a short, flexible rubber

tube extension. It is supported by a steel band curved approximately to the shape of the head, and extending from the occiput to the forehead. The band is clamped firmly, but gently, to the head by the rubber pads resting on the forehead and the occiput. The pads at the back are adjustable by a sliding extension of the head-band. At the crest of the curve of the head-band the valve-body of the inhaler is permanently fixed, with a connection at each end, for adjustment of the nose-piece and the tube from the gas machine, this latter tube being electrically warmed throughout its length.



Metal arms are pivoted to a resilient spring plate attached to the head-band, and are freely and separately movable, permitting the shaping of the nose-piece to conform with any size nose or distortion of the face. An adjuster strip at the lip end of the nose-piece renders it adjustable for short upper lips, or for free access to the cervical margins of the upper teeth. Pressure on the nose or lip can be adjusted by opening or closing the frictional

*Presented during the Third Annual Meeting of the American Association of Anesthetists, San Francisco, June 21, 1915.

connection between the extension of the nose-piece and valve-body.

The valve-body carries the inhaling and exhaling valves, discs of mica lying loosely in open cribs; the former internal, the latter external, with a clamp and lever for their control. By adjusting the valve-clamp and lever, the operator has at his command, with instant change from one to the other, the three methods of inducing and maintaining non-asphyxial anesthesia or analgesia: (1) re-breathing; (2) straight inhalation of nitrous oxid and oxygen; and (3) inhalation of nitrous oxid with atmospheric air.

A PHARYNGEAL INHALER FOR ANESTHESIA IN OPERATIONS OF THE JAWS, HEAD, NECK AND CERVICAL SPINE.*

A. E. ROCKEY, M.D., F.A.C.S.

Portland, Oregon.

The original of the device herewith presented was conceived in 1906 (*Medical Record*, June 2, 1906), and has since been modified and perfected. While intra-tracheal anesthesia has in some measure supplied an efficient method of anesthesia for head and neck surgery, however, the apparatus which I am presenting to you today has so many advantages over the newer method, in many cases, that I feel warranted in bringing it to the attention of this association of specialists in anesthesia.



It consists of three parts: (1) a reversible pharyngeal tube; (2) a long rubber connecting tube, and (3) a funnel so constructed that surplus ether cannot run into the pharyngeal tube. The funnel is also provided with a side



opening for finger control of air-admixture and a groove and spring for holding the gauze. (Fig. 1.)

A preliminary hypodermic injection of atropin gr. 1-100 to dry up the mucus, and of morphin gr. 1-6 to diminish the reflexes, is very desirable. Complete ether narcosis by the ordinary method is first produced. The throat piece is then inserted and the mouth around the tube packed with one large piece of gauze. This must be thoroughly done to secure perfect respiration through the tube and in operations on the jaw to protect the pharynx from blood. Anesthesia is then most satisfactorily maintained by dropping ether on the gauze covering of the funnel, and the anesthetist is well out of the way of the surgeon.

The large tube gives about the right quantity of re-breathed ether to each respiratory movement. In operations on the cerebellum or in laminectomy on the cervical spine, when the patient is in the prone posture with the forehead supported on a Cushing head-rest (Fig. 2), the tube may be secured in position by a piece of adhesive plaster passed across the face. The comfort with which anesthesia may be safely and satisfactorily maintained in these critical cases by the proper use of this device is most gratifying to the surgeon and anesthetist. After ten years of use, I consider it the most serviceable method of anesthesia I know of for surgery of the head, neck and cervical spine.

Index and Abstracts

A Résumé of the International Current Literature of Anesthesia and Analgesia.

EDITOR'S NOTE: Authors of pertinent articles, who desire to have them indexed and abstracted, are cordially invited to send copies of the journals containing their contributions, direct to the editor, immediately on publication. Also the receipt of reprints for filing and reference will be duly appreciated.

ANESTHESIA, CHOICE OF. T. E. Abernathy, Chattanooga, Tenn. *International Journal of Surgery*, August, 1915.

ANESTHETICS, ACTION OF IN PREVENTING INCREASE OF CELL PERMEABILITY. P. E. McClendon, Minneapolis. *American Journal of Physiology*, August, 1915.

ANESTHETICS, GENERAL. L. M. Jacobs, Philadelphia, Pa. *New York Medical Journal*, June 5, 1915.

ANESTHETIST, NON-MEDICAL, THE CASE AGAINST. Lawrence Irwell, Buffalo, N. Y. *Medical Times*, September, 1915. (See Editorial.)

ANOCI-ASSOCIATION IN DENTISTRY, A REVIEW OF THE PRESENT STATUS OF. Rich. H. Riethmuller, Philadelphia. *Dental Cosmos*, July, 1915. (See Society Proceedings.)

APPARATUS—ETHEROMETER, MEANS FOR MECHANICAL ANESTHESIA. F. Montgomery, New York City. *American Journal of Obstetrics*, July, 1915.

APPARATUS—MODIFIED GAS-ETHER-OXYGEN APPARATUS. T. L. Dagg, Chicago, Ills. *Surgery, Gynecology & Obstetrics*, July, 1915.

APPARATUS—NEW GAS-OXYGEN-ETHER APPARATUS. H. C. Luke, New York City. *Medical Record*, June 12, 1915.

APPARATUS—PULMOTOR RESUSCITATION DEMONSTRATION. B. F. Stevens, El Paso, Texas. *New Mexico State Medical Journal*, May, 1915.

APPARATUS—SIMPLE AND SAFE SOMNOFORM OR ETHYL CHLORID INHALER FOR MINOR OPERATIONS. B. W. Hornabrook, London. *Journal Royal Naval Medical Service*, July, 1915.

BLOOD, COAGULATION TIME OF, INFLUENCE OF CERTAIN ANESTHETICS AS FACTORS AFFECTING. W. L. Mendenhall, Boston, Mass. *American Journal of Physiology*, July, 1915.

BLOOD, H-ION CONCENTRATION IN, STUDIES UNDER VARIOUS ABNORMAL CONDITIONS. M. L. Menten and G. W. Crile, Cleveland, O. *American Journal of Physiology*, August 1915.

*Presented during the Third Annual Meeting of the American Association of Anesthetists, San Francisco, June 21, 1915.

- CARBON DIOXID TENSION, ESTIMATION OF IN ALVEOLAR AIR.** Paul Roth, Battle Creek, Mich. *Journal American Medical Association*, July 31, 1915.
- CHLOROFORM GENERAL ANESTHESIA, INFLUENCE ON THE RED BLOOD CORPUSCLES.** A. Z. Bilina and V. A. Shishoff. *Russkiy Vrach*, Jan. 3, 10 (Nos. 1-2), 1915.
- CHLOROFORM, LATE POISONING: ACID PRODUCTION IN THE RED BLOOD CORPUSCLES.** Editorial, *American Medical Association Journal*, July 24, 1915.
- COCAINE SOLUTIONS, ARE THEY INJURED BY BOILING?** John E. Virden, New York City. *American Journal of Surgery*, August, 1915.
- ETHER, ACTION OF AS AN ANESTHETIC, ON THE DUCTLESS GLANDS.** G. Marchetti. *Riforma Medica*, June 12, 1915.
- ETHER, DANGERS ATTENDING USE OF: OBSERVATIONS CONCERNING ITS INFLAMMABILITY.** T. L. Deavor, Syracuse, N. Y. *American Journal of Surgery*, August, 1915.

Ether, Closed and a Color Sign. JOHN BRYANT, Boston, and YANDELL HENDERSON, New Haven, Conn. *Journal American Medical Association*, July 3, 1915.

It will amply repay readers of the SUPPLEMENT to secure reprints of this article and read it in its entirety.

The authors base their views on the simplicity, efficiency and results of the Rovsing method of etherization, which has been in use at the Rykshospital for the past ten years. This method is one of rebreathing, and under it peristalsis of the intestines persists, denoting a proper tension of carbon dioxide, upon which the avidity of hemoglobin for oxygen depends. The danger sign of too much rebreathing is slight cyanosis, and as long as etherization is not complicated by cyanosis but is associated with a pinkish color, it is perfectly safe, and precludes the occurrence of the usual post-operative sequelae of open ether, nausea, vomiting and gas pains.

The authors also conclude that the advantages of nitrous oxid anesthesia are due to rebreathing, and that these advantages may be secured by closed ether properly administered. They blame postanesthetic complications on intercurrent apnea, and advise the use of preliminary medication with morphin and atropin and the avoidance of fear and excitement, not only to obviate the bodily changes reported by Cannon, but also to control pulmonary ventilation. They emphasize the fact that pallor under ether anesthesia usually means a depressed circulation because of apnea and that this condition can be successfully met by limited rebreathing. Excess of rebreathing and deficiency of oxygen are indicated by cyanotic tint; so the rule for the anesthetist is to keep the patient pink.

Ether-Oil Colonic Anesthesia: A Report of Thirty-six Head and Neck Operations, with Special Reference to Ten Thyroidectomies. JOSEPH E. LUMBARD, New York City. *Surgery, Gynecology and Obstetrics*, May, 1915.

Lumbard follows Gwathmey's technic of ether-oil colonic anesthesia, except that he does not use oil for a cathartic or any preliminary bowel medication. He prefers compound licorice powder and irrigation of the bowel with plain water, and advises against the use of soapsuds enema, as the soap will form an emulsion and retard the action of the anesthetic. A large rectal tube and the squatting position materially aid in securing a clean lower bowel. Lumbard prefers a hypodermic of morphin and atropin to the use of chloroform or paraldehyde by rectum. Thirty minutes after the hypodermic the patient is placed on the left side with the knees drawn up, and one fluid ounce of a well shaken mixture of three parts ether to one part of oil, for every 20 pounds of body weight, is administered, through a funnel attached to a well-lubricated rectal catheter. Five minutes should be consumed in administering the mixture. Anesthesia supervenes in from 5 to 20 minutes. If anesthesia is delayed over 15 minutes a few whiffs of nitrous oxid-oxygen or ether should be given or a closed inhaler placed over

the mouth and nose to deepen anesthesia. One bag of nitrous oxid will often lengthen surgical anesthesia for one-half hour.

For over-dosage the rectum should be immediately emptied with a large rectal tube having several openings. The operating table should be inclined, head up, while the abdomen is massaged, and a free air way established with a Lumbard controller of the tongue and palate. Should respiration cease use artificial respiration and forced breathing of equal parts carbon dioxide and oxygen.

The rectum should be emptied during the last part of the operation, and the bowel irrigated with tepid water, immediately on the patient's return to bed, until no remnant of the ether-oil remains, after which three ounces of olive-oil are introduced to be retained.

By diminishing the amount of mixture administered in accordance with the age, weight and general condition of the patient, over-dosage may be readily controlled.

The technic is especially valuable in head and neck operations, in which the anesthetist is in the way. In the presence of insanity or nervous tension the patient can be anesthetized without their knowledge; and the dread, usually associated with inhalation methods, is obviated. There is no excessive secretion of mucous, which is a decided advantage in bronchoscopy. The respiration and pulse are more normal than under any other method of general anesthesia. There is less hemorrhage, less tax on the heart, lungs and kidneys. While post-operative nausea, vomiting and excitement are reduced to a minimum.

The average pulse rate in the 36 cases, including 10 thyroidectomies was 86 per minute; the average respiration 27; while no nausea or vomiting occurred in 28, or 80 per cent.

Lumbard concludes: "To anesthetize an aggravated case of exophthalmic goitre without the patient's knowledge, maintain surgical anesthesia with a normal pulse and respiration, and keep the upper air passage free from mucous secretions, is one of the most difficult tasks confronting the anesthetist; but it can be done by the ether-oil colonic method of anesthesia. Having had 90 cases (with 18 different surgeons), I feel justified in recommending the extended use of the method in head and neck operations. I have never known of any rectal irritation due to this method."

INTRATRACHEAL INSUFFLATION AND OTHER MEANS OF ARTIFICIAL RESPIRATION. S. J. Meltzer, New York City. *Berliner klinische Wochenschrift*, April 26, 1915.

LOCAL ANESTHESIA. J. E. Schmidt, Muenchener medicinische Wochenschrift, May 18 (No. 20), 1915.

LOCAL ANESTHESIA—NOVOCAIN SUPRARENIN INFILTRATION AND CONDUCTION ANESTHESIA IN THE REPAIR OF INGUINAL HERNIA. Isador Seff, New York City. *Medical Record*, May 29, 1915.

LOCAL ANESTHESIA, PROSTATECTOMY UNDER. C. W. Allen, New Orleans Medical and Surgical Journal, June, 1915.

LOCAL ANESTHESIA, TECHNIC OF IN INTRANASAL SURGERY. W. Wilson. *British Medical Journal*, June 26, 1915.

LOCAL ANESTHESIA, ADVANTAGES OF COMBINING EPINEPHRIN WITH LONGER ACTING VASOCONSTRICTOR SUBSTANCES. IN. J. BURMANN. *Revue Medicale de la Suisse Romande*, Geneva, June, 1915.

Local Anesthesia, Modern Methods of Producing, for Dental Operations. HERMANN PRINZ, Philadelphia, Pa. *The Dental Summary*, July, 1915.

It is impossible to do any justice to this exhaustive paper, covering 32 pages with its discussion, by any abstract, and readers of the SUPPLEMENT are advised to secure copies of *The Dental Summary* or reprints from the author, to fully appreciate its merits.

Prinz touches on one subject, however, which is especially worthy of emphasis, and that is the question of obtunding sensitive dentine, and the pulp.

Regarding pressure anesthesia, an analgesic fluid cannot be forced through healthy dentin mechanically without injury to the tooth itself. If a cocaine solution is

held in close contact with protoplasmic fibres of the dentin, the absorption of cocain takes place in accordance with the law of osmosis. The inhibition of the anesthetic is enhanced by employing a physiological salt solution as a vehicle. On the other hand, living protoplasm reacts unfavorably against the ready absorption of substances by osmosis for two reasons: (1) Its albumen molecule is relatively large and not easily diffusible, and (2) as an integral part of its life it possesses "vital" resistance toward foreign bodies. These latter factors are sufficiently demonstrated by the fact that it is very difficult to stain living tissues. Dehydration of the protoplasm increases the endosmosis of the anesthetic solution markedly.

However, we are able to press fluids quite readily through carious dentin. We must bear in mind that such dentin has been largely deprived of its inorganic salts, leaving an elastic, spongy matrix behind. By drying out this dentin and then confining the anesthetic solution under a suitable water-tight cover, the pressure applied by the finger is quite sufficient to obtain the desired result. Colored fluids may be readily pressed through such dentin and even stain the pulp. In teeth not fully calcified and in so-called soft teeth, pressure anesthesia is more readily obtained, while according to Zederbaum, the process fails in "teeth of old persons, teeth of inveterate tobacco chewers, worn, abraded and eroded teeth, teeth with extensive secondary calcific deposits, teeth whose pulp canals are obstructed by pulp nodules, teeth with metallic oxides in the tubules, or teeth with leaky old fillings—in short, in all instances of clogged tubuli. In such cases no amount of persistent pressure will prove successful."

The pressure which can be produced by a good working, all-metal syringe, holding it between the index and middle fingers and forcing the piston with the thumb, amounts to between 250 and 300 pounds in the average man, and as the pressure required to produce a perfect contact of the anesthetic agent is much less than the above force, high-pressure syringes are not required for this technic.

When the pulp is wholly or partially exposed, the tooth should be isolated with a rubber dam and cleansed with alcohol and water. Excavate the cavity as much as possible and if the pulp is not exposed, dehydrate with alcohol and hot air. Saturate a piece of cotton with a concentrated solution of cocain or novocain, place it in the prepared cavity and cover with a piece of vulcanized rubber and with a suitable burnisher, apply slowly, increasing, continuous pressure from one to three minutes. Then expose and test sensitiveness of the pulp. Repeat the process as indicated.

When the pulp is covered with a thick layer of healthy dentin, use a small spade drill to bore through the enamel or direct into the dentin at a convenient point toward the pulp chamber. Blow out the chips, dehydrate with alcohol and hot air, and apply the syringe provided with a special needle, having as nearly as possible a water-tight point. Apply slow, continuous pressure for from two to three minutes. Then with a round burr the pulp should be exposed, and if still found sensitive the process is repeated.

Recently a method has come into vogue which allows successful obtunding of the pulp by injecting the anesthetic solution around the apex of the tooth. The spongy alveolar process, which contains lymph channels, allows the ready penetration of the fluid. The injection should be made close to the bone, pushing the needle slowly toward the apex, while the fluid is deposited drop by drop. No wheal should be raised by the injection, otherwise the benefit of the pressure from the dense gum tissue is lost. According to Hertwig, the protoplasm of the cell primarily transfers irritation and secondarily transmits absorbed materials. Therefore the anesthetic solution has to pass through the entire dental fibre before the nerve tissue of the pulp proper is reached. Consequently a certain period of time is required before the physiological effect of the anesthetic is manifested. This period of latency depends on the intermediate thickness of dentin or bone. Successful obtunding of the pulp, by this method, depends largely upon the factor of allowing sufficient time for the proper migration, absorption and action of the anesthetic fluid.

Local Anesthesia—Irritation of the Kidneys After Novocain Anesthesia. R. MORIAN, *Zentralblatt für Chirurgie*, July 10 (No. 28), 1915.

Morian declares that irritation of the kidneys is by no means uncommon after the use of novocain for local anesthesia. In from 5 to 10 per cent. of the cases in which he has used it, albuminuria developed within a few hours and could be detected up to a maximum of 48 hours. The amounts ranged from mere traces to 0.5 per thousand. Formed elements were also present in the urine. The output of urine did not seem to be materially modified by the irritation of the kidneys, but sometimes it was irregular and occasionally scanty. The adult patients had received a hypodermic of 0.01 gm. morphin half and a quarter of an hour before local anesthesia. The albuminuria did not seem to depend on the amount of novocain used or the site of injection. Almost every one of the patients operated on suffered from vomiting, a few hours after the operation. Morian adds that as neither morphin nor epinephrin induce albuminuria, only the novocain can be incriminated.

Repeated tests of blood-pressure under novocain anesthesia showed that the circulation was not disturbed and albuminuria could not be ascribed to fluctuations of blood-pressure. While novocain heretofore has not been credited with inducing albuminuria, Schwarz, in 1907, reported that he had observed albuminuria up to 7 per thousand after stovain anesthesia.

MAGNESIUM SULPHATE NARCOSIS, USE OF IN TETANUS. S. J. Meltzer, New York City. *Lancet*, June 26, 1915.

Military Surgery, Notes on. GEORGE W. CRILE, Cleveland, O. *Annals of Surgery*, July, 1915.

Some phases of the work of the Lakeside Unit in the American Hospital, Neuilly, Paris, as related by Crile in his "Notes on Military Surgery," are of especial interest to anesthetists. In reference to anesthetics Crile reports that: "Many operations being relatively short and performed on very sick patients—exhausted, exsanguinated, extremely septic—nitrous oxid-oxygen proved to be the ideal anesthetic. The Lakeside Unit took with it a supply of this anesthetic and two anesthetists skilled in its use and administration. Its great advantages were at once so apparent that our anesthetists and the supply of gas were used by the other services, especially in critical cases. Our anesthetists found that the French soldier presented a different problem than the average civilian patient in this country, in this respect, that while the stage of induction was longer and more difficult, after the induction was completed, they required a relatively smaller quantity of the anesthetic and it was easier to maintain a smooth and even anesthesia. A similar difficult induction in our patients at home would indicate a certain amount of alcoholism. It is probable that the more common use of alcohol among the Europeans would account for the general difficulty in anesthetizing patients. This difficulty is even more notably manifested in the use of ether. The French patients responded quickly at the close of operations and many of them were able to walk back immediately to their wards. During the induction of anesthesia patients frequently experienced exciting dreams of battle.

Shock and exhaustion has been so pronounced that post mortem studies have corroborated many of our former experiments on the disintegration of the Purkinje cells caused by the combined effects of emotion, exhaustion, loss of sleep, pain, infection and surgical shock. The liver also showed disintegration of the cells, the loss of cytoplasm and vacuolation. The use of morphin is the only readily available method of counteracting the effects of shock, exhaustion and pain in military surgery, especially in the presence of an overwhelming number of wounded.

NERVE BLOCKING THE LUMBAR PLEXUS: EXPERIMENTS IN. A. Schlessinger. *Zentralblatt für Chirurgie*, May 29, 1915. (No. 22.)

NITROUS OXID-OXYGEN ANESTHESIA. C. J. Larkey, Bayonne, N. J. New Jersey State Medical Society Journal, June, 1915.

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- NOVOCAIN AS USED IN SIMPLER NOSE AND THROAT OPERATIONS. E. P. Weih, Clinton, Ia. Iowa State Medical Journal, June, 1915.
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- QUININ AFTER OPERATIONS. Edmond Bonnot and A. H. Cleveland, St. Louis, Mo. Journal American Medical Association, August 7, 1915.
- QUININ AND UREA HYDROCHLORID, USE OF IN SCIATICA AND ALLIED CONDITIONS: REPORT OF CASES. H. A. Cables, East St. Louis, Mo. Lancet-Clinic, July 17, 1915.
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- RESPIRATORY DEAD SPACE, VARIATIONS IN EFFECTIVE. J. S. Haldane, Oxford, Eng. American Journal of Physiology, July, 1915.
- SACRAL ANESTHESIA. P. Bull. Norsk Magazin for Laegevidenskaben, July, 1915.
- SALINE INFUSION INTO THE SEVERED FEMORAL VEIN DURING THE COURSE OF THIGH AMPUTATIONS AND HIP JOINT DISARTICULATIONS. M. Savariaud. Bulletin de l'Académie de Médecine.
- SHOCK, SOME FEATURES IN SURGICAL. Editorial. Journal American Medical Association, July 24, 1915.
- SHOCK, THE SUPRARENAL GLAND IN. J. F. Corbett, Minneapolis, Minn. Journal American Medical Association, July 31, 1915.
- SHOCK, AVOIDANCE OF DURING SURGICAL OPERATIONS. L. Guerry, Columbia, S. C. South Carolina Medical Journal, August 7, 1915.
- SPINAL ANESTHESIA IN THE CAT. G. G. Smith and W. T. Porter, Boston, Mass. American Journal of Physiology, July, 1915.
- SPINAL ANESTHESIA, PROSTATECTOMY UNDER. CASE REPORT. E. S. Breese, Dayton, O. Ohio State Medical Journal, June, 1915.

Stomach, Visible Acute Dilatation of, During Laparotomy. W. H. LUCKETT, New York City. *Journal of the American Medical Association*, June 19, 1915.

Luckett reports two cases of acute, visible dilatation of the stomach during laparotomy due to aerophagy; the air being taken into the stomach through the mouth and esophagus in some modified process of deglutition. Veterinarians are familiar with this condition in horses and cattle irrespective of operative procedures.

One of Luckett's cases was an operation for appendicitis, the other for gastroenterostomy. In both the anesthetic was nitrous oxid-ether, administered with a Bennett inhaler followed by the open drop method.

Common to both cases was a peculiar, rapid noise in the throat, a kind of clonus of the muscles of deglutition, with a spasmodic deglutition of air (aerophagy); no discoloration of the water in which the stomach tube was submerged. It was a colorless gas that escaped. The stomach was otherwise empty, as no fluid or solid particles escaped through the tube. Neither patient vomited nor had distension after the operation, nor did either of the patients apparently swallow the anesthetic at the beginning of the anesthesia.

It must be understood, as a matter of course, that the stomach always contains a certain quantity of gas, derived partly from gases swallowed with the saliva, partly from gases which pass backward from the duodenum. The saliva contains much more carbon dioxid than an equal

volume of venous blood, a part of which is set free by the acids of the stomach. The air in the stomach is constantly undergoing changes whereby its oxygen is absorbed by the blood, and for one volume of oxygen absorbed, two volumes of carbon dioxid are returned to the stomach from the blood. Hence the predominating presence of carbon dioxid in the stomach.

While the increase of this carbon dioxid gas due to the increase in temperature of from 20 to 30 degrees F. above that of the operating-room air, may be a factor in the incidence of acute dilatation, it is more probable that the rapid interchange of gases through the more complex mechanism of the circulation, is the determining factor.

In the author's experience, the black hematogenous and highly toxic material due to some forms of sepsis and intestinal paresis, comes from the mucous membrane of the acutely dilated stomach only after the distension has been maintained for a definite period. The condition, aside from definite pathological causes, occurs in nervous, high-strung, sensitive patients, who are inclined to form and swallow a bolus of air and saliva, if left to their own devices. These patients must be warned of the danger of this procedure, or lavage of the stomach will not prove beneficial.

Although Braun and Riedel, after considerable experimental work could not find evidence of a valvular closure of the cardia, in one instance it was impossible to empty the stomach by the forcible pressure of four hands; and it spite of our efforts to counteract the esophagus, in this case, more air would enter with each gulp, indicating a valve-like action at the cardia.

The high mortality of post-operative acute dilatation is due to late recognition of the condition. Early emptying of the stomach, before the over-distention injures the capillaries of the mucosa and the consequent filling with enormous volume of highly toxic fluid, will counteract the condition.

The valve-like action of the cardia occasionally yields immediately to the prone position, in which the accumulated gas is rapidly eliminated without use of the stomach tube.

The Editor of the SUPPLEMENT is acquainted with a neurotic patient who can produce an emphysematous condition of the entire body, at will. In connection with post-operative acute dilatation of the stomach it is a pity that the experiments of Hooker in the physiological laboratory of Johns Hopkins University, in respect to the relaxation of the pyloric ring in the presence of ether vapor and carbon dioxid have not been more definitely pursued in the relation of this phenomena to the incidence of acute dilatation during and after operation.

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MINOR POINTS IN MAJOR SURGERY THAT INSURE A SMOOTHER CONVALESCENCE AND BETTER END-RESULTS.*

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Every surgeon realizes that there are many minor points associated with a major operation, that are just as important factors in securing a perfect recovery as proper surgical technic. In fact, surgeons who have absolute control of the surgical department of the hospital in which they work and make a personal study of the pre-operative and post-operative condition of their patients, are able to get results that are much more difficult to obtain under less favorable circumstances.

Too often, the surgeon's direct interest in the case ends at the operating table, the patient being turned over to an inexperienced resident for after-treatment. This is an injustice to the resident, who needs the council and instruction of the surgeon, and also to the patient whose uncomplicated recovery depends much upon mature judgment and experience.

All modern hospitals should be provided with every facility for pre- and post-operative treatment, which should include apparatus for hydrotherapy, electrotherapy, massage, Roentgen ray examination, etc. If more care is given to the preparation of patients for operation and to the assistance of their complete recovery, better end-results will be obtained and fewer "repeaters" will be seen in our operating rooms.

Assuming that a patient has come to the hospital in good general condition or has been treated at the hospital for a week or so and is now ready for operation, how shall we proceed?

During a personal study of one hundred cases at the Kerrville Hospital, we have evolved a routine which has given us the greatest satisfaction as to both immediate and remote results. In outlining this routine, it is with no idea of adding greatly to

the literature of this subject or, with few exceptions, of proposing anything new, but simply to present a correlation of procedures which have, under test, given us most excellent service.

Preparation of the Patient.—If necessary, castor oil is given forty-eight hours before the operation, after which time no cathartic is given, but the bowels are moved by an enema twelve hours before and again three hours before the operation.

We believe that cathartics, especially salts, the day before operation are conducive to gas pains. The reaction from the increased peristalsis added to the paralyzing effect of the operation, anesthetic, etc., upon the intestines, often produces an adynamic ileus. Our observation has been that handling the intestines has little to do with producing gas pains. In this series of one hundred cases there were three that developed severe adynamic ileus. The first was an external perineal urethrotomy; the second, simple inguinal hernioplasty, and the third, operation for acute appendicitis. In the first two there was no handling of the intestines at all, and in the third, a rapid, simple operation was done that necessitated only a minimum amount of manipulation of the cecum. On the other hand, there was one case of appendicitis with complications and an exploratory laparotomy that required a great deal of handling of the intestines, and yet in these there was entire freedom from gas pains.

To prepare the operative site: The part is scrubbed and shaved at 5 P. M. the day before operation. At 8 P. M., when the skin is thoroughly dry, it is painted with tincture of iodine diluted one half with alcohol, and covered by dry sterile gauze. On the operating table, the surface is again thoroughly coated with the iodine solution and when dry is ready for incision. We see no stitch abscesses. We think that scrubbing with green soap, or even with benzine, just prior to the use of the iodine, partially defeats the work of the iodine which not only kills bacteria, but hardens the surface and cements the bacteria down. Other liquids applied to the skin before the iodine is applied tend to saturate the epithelial cells and thus prevent iodine penetration.

Fifteen grains of hexamethylenamine in a glass of water is given every four hours the day before

*Read before the Bexar Co. Medical Society, San Antonio, Texas, October 7, 1915.

the operation. This helps to prevent cystitis if the catheter must be used, and also seems to help obviate the necessity for post-operative catheterization.

A small firm pillow placed so as to preserve the curve of the spine and prevent strain on the ligaments due to muscular relaxation, will do much to prevent post-operative backache.

The Anesthetic.—After a study of various anesthetics and several methods of administration, the method which we have adopted as most generally useful, and have employed for the past two years, with few exceptions and with no regrets, is: three-quarters of an hour before operation, $\frac{1}{4}$ gr. of morphine, $\frac{1}{200}$ of atropine and $\frac{1}{100}$ of scopolamine are given hypodermatically. Chloroform, from a bottle which has been sitting in hot water, is now dropped slowly onto an ordinary Esmarch mask until the patient is asleep. If the operation will take more than half an hour from the time the anesthetic was started, ether is substituted for the chloroform just before the incision is made and is given by the drop method on the same mask, which, however, is provided with a rubber cover having an opening in the top. This is similar to the method now employed by Ochsner. During the past few months we have been experimenting with the use of aromatic spirits of ammonia both during and following the administration of the anesthetic, as suggested by Parsons in *The Therapeutic Gazette*, April 15, 1915. The anesthetist has a drop bottle at hand containing aromatic spirits of ammonia and drops a few drops on the mask as conditions may indicate, then as soon as the surgeon orders the anesthetic stopped, the inhalation of ammonia is begun and its administration is continued slowly and at intervals, by the nurse, until the patient is out from under the influence of the ether. While the method is still in the experimental stage with us, we are of the opinion that it will prove of much benefit.

Of course special methods of anesthesia are indicated in special cases. Of these special methods, one that has given us very good results, especially in hemorrhoid operations, is novocain, sacral anesthesia. A needle about 10 cm. in length is introduced into the sacral canal at the sacro-coccygeal joint for a distance of about 5 cm. If no blood or cerebrospinal fluid appears, the syringe is attached and 30 to 40 c.m. of 1 per cent. novocain solution containing $\frac{1}{4}$ of 1 per cent. of calcium chloride are slowly injected. Anesthesia is complete in from 20 minutes to half an hour and lasts from one to two hours.

The "axillary sup" used as a routine in Lane's clinic is highly recommended by Murphy. He says,

"that it materially reduces shock, keeps up blood pressure and the patient leaves the table in about as good condition as at the beginning of the operation." He thinks it should be resorted to in all severe and prolonged operations.

For some time glucose solutions have been used by mouth and per rectum to prevent acetonemia. It occurred to us that the best place to combat this effect of the anesthetic is in the blood. The best time to carry it out is during the administration of the anesthetic, and the best method of accomplishing it is by an improved "axillary sup." Hence as soon as the patient is asleep, a needle is introduced into the loose tissue of each axilla or is placed under each breast, and from one pint to one quart of a 5 per cent. glucose solution in a normal salt solution is allowed to flow slowly in. This procedure lessens acetonemia, shock and thirst, and we deem it a most valuable aid to a smooth convalescence, a marked advance over the pre-operative and post-operative use of glucose solution.

Incision.—We prefer a rectus incision for intra-abdominal and pelvic operations, for we believe that a systematic examination of all abdominal and pelvic viscera should be made in practically all cases where there is no danger of spreading infection.

Drainage.—The mooted question of drainage we are solving better each day, for as our surgical technique improves we find less call for a drain. In excessive oozing we must very often drain, but we have found that the use of coagulene (Kocher-Fonio) or coagulose (Parke, Davis & Co.), not only controls troublesome oozing, but also aids in checking quite severe hemorrhage. We have demonstrated to our entire satisfaction that they are much more potent than horse serum for this purpose. They have on several occasions done us most excellent service.

If pus is present in small amount, that can easily be wiped up, the surface is cleansed by gauze wiping, then two ounces of ether is poured into the free abdominal cavity and the wound is closed without a drain. This method originated in France. It has proven a valuable one to us, as it seems to prevent adhesions as well as sepsis. After the intestines are bathed with ether and the ether has evaporated, they are left dry and free from bloody exudate, but covered with a thin film of fat which was dissolved by the ether and left as a deposit when the ether evaporates, thus covering raw surfaces and preventing adhesions. No deleterious effect has ever been noted and we have used it for two

years, in both clean and pus cases. Ether is the only irrigating fluid we use in the peritoneal cavity.

Stitching Up.—A running stitch of No. 1 plain catgut so placed as to coapt, but neither invert nor evert the edges of the peritoneum and posterior rectus sheath, is used for this layer. Inversion causes adhesions and eversion makes a weak posterior rectus sheath by interposing peritoneum between the cut edges of the sheath. Two or three silkworm-gut tension stitches are then placed through skin, fat, fascia, muscle, down to peritoneum and left untied. Now one or two sponges, hot enough to blanch the tissues, are applied to the wound surface to stop all oozing and leave it perfectly dry, then the anterior sheath of the rectus is carefully approximated by a buttonhole stitch of No. 2 iodized catgut, another hot sponge is applied and the deep tension stitches are tied, which obliterate all dead space. The skin edges are approximated by metal clips, care being taken not to apply them too tightly. The wound is then painted with the iodine solution and eight layers of dry sterile gauze are strapped on by long adhesive strips, so placed as to give proper support. The wound is first examined in seven days when the deep stitches and skin clips are removed and the patient is allowed to sit up. We have had no post-operative hernias and have used this method of wound closure for six years.

Back in Bed.—When the patient is returned to the bed from the operating table, the Murphy drip with 5 per cent. glucose solution, is started and carefully watched to keep its temperature up, for if it becomes cool it may become a dangerous agent, increasing instead of preventing shock.

When the patient recovers from the anesthetic, if he is very restless or in much pain, 1/6 gr. of morphine, 1/200 gr. of atropine and 1/30 gr. of strychnine are given. If he has no pain, the strychnine is given alone and repeated in four hours. This is not to combat shock as we formerly thought it did, but to improve the nerve tonic of the intestines and stomach and prevent adynamic ileus.

Whenever after these precautions, severe gas pains or dilatation of the stomach occurs, which cannot be relieved by the various simple measures, we have obtained most excellent results from the hypodermatic use of 1/50 to 1/25 gr. of Eserine. This treatment, while rather spectacular, has been perfectly satisfactory. Pituitrin, we have tried and find that if given early, as a preventative, good results may be expected, but in fully developed cases of adynamic ileus, it is disappointing.

At the end of the first week the patient may well be started on some line of tonic treatment as mas-

sage, salt friction baths, high frequency electricity, etc. These measures alone or in connection with the proper drug medication will do much to relieve both the physical and mental depression following an operation. In fact, in patients who have been sick for some time previous to the operation and where, as is usual in these cases, the mind has formed the habit of thinking sick thoughts, the psychic effect of the after-treatment aids much in correcting these habits and in securing perfect end results.

INJURIES TO THE CHEST.

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Injuries to the chest wall are classified as contused, incised, lacerated, punctured and penetrating. For clinical purposes a much simpler division is (a) penetrating and (b) non-penetrating. In contused wounds where the periosteum of the ribs is involved, it is oftentimes difficult to differentiate between periosteal bruising and actual rib fracture; we often have to bring the x-ray into use to make the differentiation. Contusions may vary in extent from the slightest abrasion with bruising of the skin, to the most extensive destruction involving deeper tissues, including the bone, complicated by shock and resulting in death. Non-penetrating chest wounds may be either incised, punctured, contused or lacerated. Under the heading of punctured wounds are included those where the depth of the wound is greater than the diameter of the opening.

Lacerated and contused wounds are usually produced by blunt instruments, the skin together with the surrounding area and subjacent tissues being involved. Incised wounds are inflicted by sharp or cutting instruments. Punctured wounds are caused by sharp-pointed instruments, as of iron or wood. In the production of punctured wounds which injure the tissues but seem confined to the chest wall, the instrument usually strikes a rib. A fall from a distance landing on a picket fence or some other sharp object, ordinarily produced a punctured wound.

Contused wounds of the chest are often followed by so-called traumatic pneumonia, in which the clinical signs are frequently unlike those of lobar pneumonia, the onset being insidious in character with no initial chill. Much has been written concerning the origin of this type of pneumonia. Demuth considers such pneumonias as inflammatory infiltrations (lobar blood infiltrations), the fever depending

upon absorption of the products of decompositions of the blood. Dumstrey claims that, owing to the injury which it has received, the alveolar epithelium furnishes a place of lowered resistance in which the diplococci of pneumonia may develop. I am inclined to agree with the latter's version.

The symptomatology, diagnosis and treatment of chest injuries will depend upon the severity and amount of the damage inflicted, and the appearance of the injured region. The treatment of non-penetrating wounds may be stated in one word, viz., cleanliness? Incised and lacerated injuries where no dirt or clothing has been carried into the wound, are best treated by the free application of tincture of iodine. In some incised wounds a few sutures may be necessary. When dirt or clothing has been carried into the wound, drainage is sometimes required. When the injury is received about a stockyard, stock car, or stable, the wound should be cauterized with phenol, followed by the application of an antiseptic dressing, the patient being given a prophylactic dose of about 5 cc. of antitetanic serum. Contused wounds without laceration or abrasion are best treated by the application of adhesive plaster, such as is used in fractured ribs; the use of liniment and heat will sometimes do good; where there is any question whether or not fracture of a rib has occurred, I think adhesive plaster should be applied.

"In addition to the ordinary injury to the chest wall there might be mentioned one described under the name of *commotio thoracica*, which resembles contusion or laceration of the brain. Sudden death may follow severe *commotio thoracica*, and the autopsy fail to reveal any tangible lesion. In these cases the sudden death is due to shock. In *commotio thoracica* the pain is very severe, abdominal respiration is present and a peculiar decubitus is observed in which the patient, while lying upon the back, inclines at the same time toward the injured side."

Injuries involving both the thorax and the abdomen are relatively infrequent. However, it must be remembered that the wall of the diaphragm reaches the level of the fifth and it may be the fourth rib on the left side, that the pleura lines practically the entire wall of the thorax, and therefore a penetrating instrument may traverse the pleural cavity and enter the cavity of the peritoneum. Under such circumstances the injury to the abdominal viscera may be the more serious element. The organs most likely to be injured are the stomach, the liver, the spleen and the kidney. Penetration of the diaphragm on the left side may result in one

or the other of the forms of diaphragmatic hernia.

Fractures generally occur from the fourth to the eighth rib, the upper moving rib being more protected. The floating ribs yield more readily to external pressure, and are therefore less often broken. The most frequent site of fracture is at one or the other end of the rib. The ribs most frequently broken are the fifth and sixth. A rib may be fractured in one or two places, or it may be simply cracked. The diagnosis is not always easy. The simple fracture is most easily felt by pressing the hand flat on the chest, and directing the patient to take a long breath. Sometimes placing two fingers over the site of pain, and pressing one inward, elicits crepitation. It is a good plan to examine each rib carefully with the fingers to determine crepitation if possible. Sometimes this sign is so difficult to obtain that it is impossible to be certain whether a rib is broken or not; but if the patient has intense pain at the end of inspiration, or upon turning suddenly in bed, and if his respiration is short and hurried, one may be justified in assuming that one or more ribs have been fractured. The ribs are generally broken by direct violence, but a number of cases are recorded where during violent sneezing or coughing one or more ribs have been fractured; and where disease of the bone existed turning over in bed has been known to cause such fractures. I have seen several cases of dislocation of the clavicle at the sternum from violent coughing. A fractured rib may cause serious complications, provided puncture of the viscera occurs.

Fractures of the sternum are rare. They may be either transverse or oblique, and caused by either direct or indirect violence. They occur between manubrium and gladiolus, or at the ensiform cartilage. The upper part of the sternum is usually displaced backward behind the gladiolus, and may be reduced when possible by placing the patient on the back, placing the knee between the shoulders, and pressing the rib and gladiolus downward. When impossible of reduction, unless the manubrium is causing serious pressure symptoms, operative intervention is unnecessary. The ensiform cartilage may be driven backward by direct violence, and because of pressure upon the stomach vomiting may be so persistent that an operation to restore the displaced cartilage may become a necessity. "Of 225 collected cases of injuries to the chest due to kicks of horses, railroad disasters, falls and other accidents, there were only five fatal cases."

In fractures involving both ribs and sternum the intercostal and internal mammary arteries have been injured, and in fracture of the clavicle the subcla-

vian artery and vein have been wounded. These vascular injuries should be treated in the same manner as wounded bloodvessels in other localities. Compound fracture of the rib and clavicle should be treated as other compound fractures. Compound fracture of the scapula, however, is treated in a somewhat different manner. Where there is comminution of portions of the body, the pieces of bone should be removed in fracture of the scapula which would be left in similar fractures of other bones, to permit drainage of infectious material which might otherwise gravitate downward behind the body.

Fractures of the clavicle are of quite frequent occurrence, especially in childhood, where, according to Kronlein, the fracture takes the place of dislocation of the humerus in adult life. The most frequent site of clavicular fracture is at its middle third. It may be transverse or oblique, and partial or complete. On account of the clavicle acting "as a kind of out-rigger for the shoulder," the trapezius muscle holding it from above and the pectoralis major steadying it from below, when fracture occurs the weight of the arm causes the shoulder to fall downward and forward. In the treatment of these fractures, after having carried the shoulder upward and backward, I have usually employed the four-tail bandage with a pad under the arm; in some instances Sayre's adhesive plaster dressing is most useful, especially in the winter time. In the case of a young woman, where more or less deformity would be unsightly, rest in bed in the recumbent posture with a small pillow between the shoulders and the arm strapped to the side, will give the best results. Fracture of both clavicles is exceedingly rare.

The clavicle is frequently dislocated. I have seen several such cases at the sternal end, and a few at the acromial end. The notch in the sternum for its articulation is much smaller than the sternal end of the clavicle. This dislocation is sometimes quite difficult to keep reduced. A figure-of-eight bandage about both shoulders and across the chest, or a plaster of Paris bandage about the shoulders and chest, may be regarded as the best modes of treatment. The acromial end is sometimes dislocated by a fall on the shoulder. This is another dislocation which often gives trouble in the matter of maintaining reduction so that deformity may be prevented. The drawing of the shoulder either directly upward, or forward and backward, or forward, at the same time pressing the clavicle forward toward its place, will effect reduction; the only opposition that really has to be overcome is the weight of the

arm which draws the shoulder downward and inward away from the clavicle. Wiring the clavicle at the acromial end is sometimes practiced when the simpler method of adhesive strips passing over the dislocated end of the clavicle and underneath the elbow with a swath around the body holding the arm at the side, has failed.

Fractures of the scapula occur in about one per cent. of all fractures. The most frequent fracture is through the body. I have seen one such fracture which passed through the body and also the spine at about its middle. After a great deal of manipulation and examination I was able to elicit slight crepitus. Three exposures to the x-ray had to be made before my diagnosis could be confirmed. This patient was treated with the shoulder cap and his arm fixed to the side. I saw him several months after the accident where there seemed to be complete atrophy of the infraspinatus and partial atrophy of the supraspinatus causing the spine of the scapula to stand out in bold relief. I presume there must have been injury to the nerve at the time of the accident to account for the atrophy which later occurred. I have also had one other case which was supposed by three prominent surgeons to be a fracture of the glenoid cavity of the scapula. This man came under my observation about two years afterward, and was operated upon for subacromial bursitis which gave him complete relief. I mention this to show the difficulty sometimes encountered in distinguishing between bursitis and injury to the glenoid cavity or some other part of the shoulder articulation.

Where pointed instruments penetrate the chest wall and wound the lung, a variety of symptoms may be noted. Among those which usually develop after a penetrating wound of the thorax are: hemoptysis, emphysema, pneumothorax and hemothorax. Some days after injury to the viscera, pneumonia, pulmonary abscess, bronchitis, gangrene, or hernia of the lung may occur. Ransohoff successfully sutured a bullet wound of the lung, his method of procedure being as follows: The rib adjacent to the wound is rapidly resected, and the pleura widely opened. Search for the bleeding point can be successful only if that lobe of the lung in the direct course of the bullet is grasped and delivered through the incision. After the hemorrhage is checked, the pleura is cleansed of blood and clots, and the wound closed without drainage. The wound must be sutured in two layers, hermetically sealing the pleural cavity; if this be not done, the pneumothorax, which is invariably present, is likely to be complicated by infection.

The spitting of blood may occur after concussion or slight injury to the lung substance by a broken rib, and is frequently accompanied by emphysema. In other cases of injury to the lung, instead of emphysema occurring, air rushes into the pleural cavity compressing the lung and causing the most distressing dyspnea. This may be relieved by passing a trocar and canula into the pleural cavity and allowing the air to escape, then inserting a rubber tube with a flange to prevent it from entering the cavity, and applying an antiseptic dressing. In certain instances, in addition to air in the chest there may exist a large quantity of blood from injury to vessels in the lung. These cases are generally so serious that no operative intervention is indicated, especially if the hemorrhage has been extensive. Venesection is recommended in case of severe hemorrhage to produce faintness and thus possibly cause cessation of the bleeding. A certain number of patients recover from arrest of the hemorrhage and absorption of the fluid. The balance of surgical experience points to the importance of not interfering unless there is evidence of emphysema. Where there is an injury to the chest with free hemorrhage, the question of opening the wound, turning out the clot, searching for the bleeding vessel and if possible securing it, must always be considered, and execution of the procedure may be justifiable in some cases. The hemorrhage may be so great on turning out the clots that it may be advisable to pack the cavity with sterile gauze.

While, according to Stetten, injuries of the great thoracic vessels are usually rapidly fatal, if the patient be seen promptly operation may be successfully performed. Von Eiselsberg sutured with success a stab wound of the root of the pulmonary vein; Kuettner did likewise with a wound of the pulmonary artery; Heile successfully ligated the pulmonary vein. Injuries to the aorta and its branches, also the vena cava and innominate veins, are easily accessible by trans-pleural routes. Stetten believes that the severer injuries or ruptures of the lung with progressive hemorrhage, so-called "tension pneumothorax" and mediastinal emphysema, demand thoracotomy and pulmonary suture, though differential pressure or insufflation is by no means a necessity, as the lung is already collapsed and the chest cavity has adjusted itself to the changed conditions. Sauerbruch claims, however, that the operation is more satisfactorily performed under these measures.

During laboratory experimentation upon animals Teske found that the dangers from opening the thoracic cavity could be obviated by using mechan-

ical means to prevent the diaphragm from making excessive excursions. Traction on the manubrium before opening the chest had this effect, and he suggests traction upon the costal arches on both sides as likely to prove effectual in the human being.

Schumacher believes operative treatment for injuries of the pleura and lung should be executed under differential pressure. By operating in a special cabinet respiratory and circulatory disturbances from acute pneumothorax are prevented. Another advantage is that the surgeon can more readily locate minute lesions in the lung after it has been artificially inflated than when it is collapsed. After operation the chest wound can be completely closed, as there is no risk of pneumothorax or subsequent infection. The simplest operative technic consists of a large Mikulicz-Sauerbruch incision in the fifth, sixth or seventh intercostal space. He reports seven patients operated upon with three cures.

Traumatic hernia of the lung is of infrequent occurrence. It is usually seen in wounds which open the pleural cavity without involving the lung itself. The wound in the chest wall must be of a certain size to allow protrusion of the lung, and it must correspond in position with one of the borders of the lung or with the corner of one of its lobes. The hernia may develop as soon as the penetrating weapon is withdrawn, or it may not occur for many hours after the injury. Violent expiratory movements have much to do with its production. The hernia may oftentimes be returned, but if left undisturbed it is likely to become strangulated, congested and irreducible, and may finally become gangrenous and sloughing then occurs. When this happens healing is satisfactory as a rule. The wound in the chest is closed with scar tissue, and the lung remains firmly adherent to the chest wall.

Wounds of the pericardium and heart are produced by pointed instruments that penetrate the chest wall. The chest injury is commonly in the precordial region, and may appear to be of little importance. The pericardium may alone be wounded, probably when it is "on the stretch" between its two attachments. The cardiac wall may be penetrated or perforated. The nature of the wound varies with the instrument causing it. The puncture of a needle is readily filled with clot, whereas a stab with a knife may produce a wound that gapes. The pericardium has been stitched after cutting injuries. The great bloodvessels of the chest may also be involved in penetrating injuries to the chest wall. Should the patient survive severe injury to the viscera, he may later become the victim of septic complications.

The treatment of cardiac wounds does not differ materially from that applicable to chest wounds in general. Absolute rest in the recumbent posture is essential; application of an ice bag to the chest is useful; morphine may be required to control pain. If there is an accumulation of blood in the pericardium, its evacuation may be advisable. The use of trocar and canula for this purpose, however, is to be condemned because of its incapacity to evacuate blood that is clotted; moreover, it does not allow one to identify and secure the bleeding point, and its use entails the risk of wounding the heart or the pleura. Incision of the pericardium (open operation) is the procedure recommended. Great care should be exercised not to open one or the other of the pleural cavities. If after opening the pericardium there should be a wound of the heart wall, it may be closed with interrupted sutures of fine silk. The sutures should not include the endocardium. Should the patient recover, he must be prohibited from attempting any exertion for several months, for fear of the scar yielding and causing aneurism or rupture of the cardiac wall.

Fischer collected 452 cases of wounds of the heart, with 380 deaths and 72 recoveries. Death was immediate in 104, and in 270 it occurred after intervals varying from one hour to nine months.

In Vaughan's collection of 26 cases, where the cardiac wounds were sutured, there were nine recoveries and seventeen deaths. Out of 34 cases of heart suture collected by Sherman, five died on the operating table of hemorrhage, ten died soon after the operation, and thirteen recovered.

Peck's analysis of 160 cases shows thirty-six per cent. recoveries. In more than sixty per cent. of the fatal cases the patients succumbed to secondary causes, usually infection.

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COMMON HEAD INJURIES.

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Under this heading I wish to speak of the common classes of injuries to the cranium one sees each day. A patient is struck on the head by a moving object, or falls, and is injured, causing either a fracture of the skull, cerebral irritation, concussion or compression. Here lies the importance of an early diagnosis. Should the patient arise, walk a little way or resume his duties and then progressively become worse, it is safe to say that he has an intracranial hemorrhage, with pressure. He lapses into unconsciousness, coma, symptoms of paralysis develop, stertorous breathing, choked disk, inequality of pupils, and if hemorrhage is sufficient, death.

For example, a case of my own: A man twenty-six years old was sitting in a grand stand and watching a baseball game, when he was hit on the head by a foul ball. He was unconscious only a moment, and wanted to stay at the game, but his brother insisted and finally succeeded in taking him home and putting him to bed; there he was comfortable, happy, and felt quite himself. His brother left for awhile and on returning in about twenty minutes found him in a state of unconsciousness. He was then taken to a hospital and prepared for operation. An enormous clot was found and removed, hemorrhage from the middle meningeal artery was stopped, and the wound was closed, with a few strands of silk worm gut drainage. The rapid onset of the second period of unconsciousness was a bad symptom and caused me to give a bad prognosis. Owing to the size of the clot its pressure had caused an anemia of the brain cells, lasting so long that they never regenerated and left him demented, although he was able to walk from the hospital at the end of three weeks.

If the pressure is sufficient to cause an anemia of the brain cells, lasting for twelve minutes or more, they will not regenerate; and when brain tissue is torn or diseased, it never heals. The process may be abated but the injury caused to the brain substance remains permanent. In fracture of the skull, whether compound or simple, punctured or closed, the recognition and emergency treatment are the same. But when the skull is broken through and its fragments penetrate or depress the brain, it is highly probable that considerable injury has been done the brain. An immediate operation is imperative. Or the skull may be simply contused, causing a rupture of a vessel below or an opening of the lateral sinus, resulting in fatal hemorrhage.

Again the bone in the frontal region may be literally crushed and yet no grave symptoms arise, but still the amount of bone involved usually gives one an idea of the condition underneath. Fracture of the vault of the skull without basilar fracture is more rare than is usually supposed. The latter occurs in two-thirds of all vault fractures. Eighty-five per cent. of all fractures of the base originate in the vault. Skull fractures, regardless of their first innocent appearance, should be carefully watched, especially the puncture variety, so often overlooked. Basilar fractures are much more dangerous to life than vault fractures. First, because greater trauma being necessary to cause them, necessarily more cerebral disturbances are produced; second, owing to the vital centers here located; third, on account of danger of sepsis.

Fractures at the base of the skull are very difficult generally; they usually involve the petrous portion of the temporal bone with hemorrhage from the ear, mouth and nose.

This is always looked upon as a fairly accurate diagnostic sign. The mortality in base fractures is extremely high, due to the shock and brain laceration, and many succumb in their first few hours. In an analysis of thirty-five cases of compound fractures of the base of the skull, admitted to the hospital, all presented the classical picture of fracture of the base to which was added bleeding from the nose, mouth and ears. Of these thirty-five patients, fourteen died, and twenty-one recovered, either completely or partially, but in condition to walk from the hospital. This is a general mortality of 40%; six died during the first forty-eight hours, all in primary shock. Eight died after the third and before the fifteenth day, after partially or wholly recovering from the shock of injury. Of the eight, five died of meningitis, and one of secondary hemorrhage; in the other cases the cause of death was unknown. From the foregoing, we can see that the mortality is still high in those cases that survive the primary shock, in this series twenty-three per cent.

Diagnosis of fracture of the vault may offer difficulty, particularly in cases of linear fissure, and those involving the inner table alone. But one is more apt to be misled into a diagnosis of fracture by the peculiar feel of the infiltrated edge of a sub-aponeurotic extravasation, rather than to overlook one that really exists in fractures of the base. We must particularly depend upon the symptoms which we have been taught to recognize rather than any direct evidences of trauma, or bony lesions. Evidences of intracranial or extracranial bleeding,

either free or into the tissues, is of great value; bone injury gives only a comparative knowledge as to the severity of the injury and the amount of trouble below.

Concussion, Contusion and Compression.—These terms, though used interchangeably, have quite different degrees of meaning, although any of these conditions may come from like injuries. The three fit so closely one into the other that it is hard to say where one begins and the other ends. Concussion and contusion are the effects solely of traumatism; should hemorrhage follow such an injury, or the accumulation of exudate within the intact cranial cavity, there develops cerebral compression. In concussion an individual may be momentarily stunned by a slight blow on the head with no untoward after-effect, while a more severe blow may lead to temporary loss of consciousness, with dizziness and headache, which may persist for a time. A more violent blow may produce unconsciousness and leave the victim mentally disturbed for hours or days. Disturbances of consciousness are essential to concussion, and as unconsciousness disappears, evidence of cerebral disturbances appear; there are headache, nausea, vomiting, subnormal temperature, cardiac and respiratory changes. And when the patient rallies there is a loss of memory, or knowledge of the injury. The pupils early in the injury are apt to be contracted. Any cranial injury that results in concussion must be given a guarded prognosis. Concussion with or without laceration, usually occurs at the tips of the temporal and base of the frontal lobes, and usually opposite the external impact which caused it. These lacerations frequently occur in company with base fractures because the same injury that causes the laceration also causes the fracture.

Compression may occur in many ways, either by the accumulation of new substances or an abnormal accumulation of the normal cerebro-spinal fluid. Thus a tumor, a new growth, an oozing hemorrhage or anything that will encroach upon the space occupied by the brain causes compression unless the process is destructive to brain tissue; then it may proceed for a long while without producing diagnostic symptoms. Should there be present an abundance of cerebro-spinal fluid, and an attempt is made to release it by lumbar puncture, the removal of the pressure from below would cause the pressure above to wedge the medulla and cerebrum into the foramen magnum causing sudden death.

The blood pressure often gives a direct clue to cranial injuries. With increased intracranial pres-

sure, one expects a corresponding increase in the blood pressure unless the patient is in a profound shock. The three most common pathological conditions that influence blood pressures are: first, kidney lesions, particularly the contracted types of chronic nephritis; second, arterial sclerosis of the main trunks; and third, increased intracranial pressure from whatever source, blood clot, neoplasm, or an excess of cerebro-spinal fluid.

Treatment: Whatever is to be done, must be done at once, if as in the case of middle meningeal hemorrhage one cannot with safety await the patient's removal to a hospital, and the preparation of instrument rooms and patient for operation. But a simple effective treatment advised by Murphy is easily and quickly accomplished by ligation of the external carotid artery which gives off the internal maxillary and this in turn the middle meningeal, which enters the skull through the foramen spinosum. The patient being unconscious no anesthetic is needed; instruments can be sterilized in burning alcohol; sterilize the skin with tincture of iodine, cut through it, expose the external carotid artery at the cornu of the hyoid bone just below where the digastric crosses it, and tie. The ligation of this artery is not a serious proposition. The middle meningeal artery being an end artery it does not bleed from collateral branches when the direct source is shut off. Here we are confronted again by the necessity of distinguishing between the management of the fracture itself and the complications. Rather simple rules can be laid down for the fracture. The treatment of the vault is usually the correction of the deformed fragments, rather than correction of the cerebral complications. In fractures of the base quite the reverse obtains: a more critical intracranial complication is present, and deformity is rare. In basal fracture, rest, quietude, and ice cap are advisable, and sedatives when there is great restlessness; free movements of the bowels with saline; the nose and ears to be swabbed out with antiseptic,—but never washed,—and plugged with sterile cotton. In cerebral compression, the treatment consists in removing the cause: the cloth, the depressed bone, tumor, or abscess. Lumbar puncture with the idea of removing fluids and relieving pressure is a dangerous procedure, as stated above; the cerebro-spinal fluid should be removed by trephine through the skull rather than through the spinal canal. Venesection should be resorted to in order to lower the blood pressure and deplete the brain; tumors and abscesses are to be removed by the usual method. When operating for tumor or depression from frac-

ture the exact area involved need not be perfectly mapped out, as was necessary in times when only trephine openings were made. Now we raise a large flap of bone and can clearly see the condition of the underlying meninges, as well as the brain and interior of the skull.

BLOOD PLATELET EXTRACT, A PHYSIOLOGICAL HEMOSTATIC, IN NOSE AND THROAT SURGERY. A PRELIMINARY REPORT.

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In 1913 Anton Fonio, first assistant in Kocher's clinic in Basel, published the results of his search for a physiological hemostatic substance. He succeeded in obtaining a body from the blood platelets which he claimed was permanent but the exact structure of which was not known.

The active principle of the coagulation of blood is thrombin (fibrin ferment) which transforms the fibrinogen into fibrin. Thrombin depends for its production upon two mother substances to which the names thrombogen and thrombokinase, respectively, have been given. Of these thrombogen is a very delicate and unstable body whilst thrombokinase is of a more stable nature.

It has been demonstrated that extracts of different tissues all contain substances capable of coagulating blood or of accelerating its coagulation. These various tissue extracts are believed to be thrombokinase which, according to some authorities, is present in all tissues. According to Fonio the blood platelets are extraordinarily rich in thrombokinase. He holds that the blood platelets are the real source of thrombokinase and that the hemostatic properties of a tissue extract depend upon the blood platelets contained in it. Working on this hypothesis he made extracts of blood platelets which he got by the fractional centrifugalization of large quantities of animal blood.

The resultant substance, which has been called coagulen, is a yellow, granular powder of a peculiar odor and with a somewhat sweetish taste. Its exact composition is not known but it is either the body thrombokinase (Morawitz) or something closely allied to it. It is soluble in water and can be subjected to a temperature of 100°C. for several minutes without losing its identity or deteriorating in its activity. In isotonic salt solution it can be injected into the veins without causing thrombosis

either at the site of injection or remotely. Its action, so far as I have been able to determine, is the same in different specimens.

In solution coagulen does not keep for more than a few hours and it is best prepared immediately before using. The powder should be dissolved in sterile normal salt solution, and their solution may be resterilized by boiling for a few minutes. For intravenous and subcutaneous injection Fonio recommends a 3½% solution, although other observers have used it in 5% solutions without untoward results.

I have used it in a 10% solution, locally, in the nose and throat as a post-operative hemostatic and while yet there is only a small number of cases to draw from I can confirm the results of Fonio, that coagulation is both more rapid and more intense when the coagulen solution is applied to the wound.

Most of the cases in which I used coagulen were of hypertrophied tonsils and adenoids, about twenty-five in number. It was used both in patients at the Mount Sinai Hospital and in private practice. Among the number were several adults. The cases were all operated upon under general anesthesia and the operation in every case was complete tonsillectomy, the tonsil being freed with a dull broad-bladed elevator and removed with a cold wire snare.

During the operation the mouth is kept free from blood and mucus by aspiration with a motor-driven suction pump. The anesthesia is administered through the same apparatus. The constant aspiration of blood and mucus gives a clear field and minimizes the danger of trauma to the neighboring structures. It also renders it possible to accurately determine the amount of hemorrhage that follows the removal of the tonsil. Immediately after the tonsil is out a sponge that has been dipped into a freshly prepared 10% solution of coagulen is placed in the fossa and gentle pressure is maintained for about a minute. Usually when the sponge is removed there is no further bleeding. Occasionally, in those cases where there has been considerable hemorrhage after the removal of the tonsil, there may still be a little bleeding. This has always been controlled by further application of the solution. It has not been found necessary to ligate a vessel in any of these cases.

The other tonsil is removed in the same manner. The field is almost entirely free from blood. The adenoidectomy, which is done in the usual way with the curette, is attended with surprisingly little hemorrhage.

In none of the cases was there any post-operative

hemorrhage. The patients made quick and uneventful recoveries. The children were willing to play soon after recovering from the anesthesia and the adults expressed themselves as feeling perfectly well.

With this adjunct I believe that post-operative tonsillar hemorrhage can be obviated and that tonsillectomy can be done in the adult on both sides at the same sitting without any danger of serious bleeding.

In the nose my experience has been confined to only a few cases, sub-mucous resection of deviated septa and middle turbinectomies. In the turbinectomies the nose was packed, up to the wound, with gauze wet with the solution. At the end of twelve hours the packing was removed. There was usually no bleeding. Sometimes there was slight oozing, which subsided of its own accord in a few minutes.

In the submucous resection cases the nose was packed with gauze wet with the coagulen solution, a piece of sterile rubber tissue being first inserted so as to overlay the incision. After packing the nose the rubber tissue was removed, leaving the edges of the incision in contact. These packings were allowed to remain twelve hours. When they were removed there was little if any oozing, the edges of the incision were in approximation and there was never any hematoma between the layers of mucous membrane. It was never found necessary, either in the submucous resections or in the turbinectomies to pack the nose a second time.

Although this has been a rather meager experience as to the number of cases, it has, I think, been sufficient to substantiate the claims of Fonio that the extract of blood platelets is a physiological hemostatic the use of which is not followed by untoward results. As to the permanence of the preparation, I am using today extract that was made almost a year ago.

CONSERVATION OF INJURED FINGERS.

Injured fingers should never be amputated simply because the soft parts have been scraped or cut away from the bone. Such fingers, denuded of the integument and muscles, may often be made useful members by thrusting them into a pocket made beneath the skin of the abdomen or thigh, and keeping them there with sutures for about two weeks. By such a plastic operation a cutaneous covering can be given to the denuded bones. To amputate them before endeavoring to cover them with integument in this manner is bad surgery in very many instances.—J. R. ROBERTS, in *The Therapeutic Gazette*.

FOREIGN BODY CREPITUS IN THE UTERUS. AN UNUSUAL PHYSICAL SIGN IN GYNECOLOGICAL EXAMINATION. WITH A CASE REPORT.

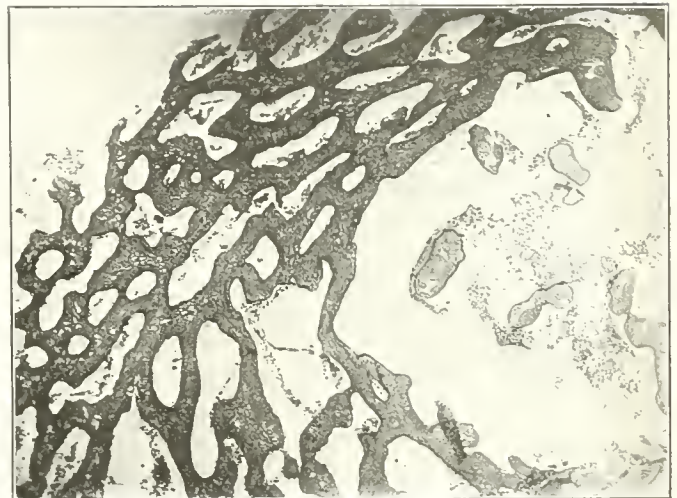
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Foreign bodies in the uterus are ordinarily introduced during masturbation, for contraceptive purposes, or to overcome sterility and dysmenorrhea, and if broken within the uterus, they are consciously missed by the patient or physician. Rarely an instrument is unconsciously broken during intrauterine manipulation and the fragment is left in without the knowledge of the patient or the physician. The consciousness of the surgical accident is in the vast majority of instances equivalent to the diagnosis.

The following case is one in which the patient had no knowledge of any instrument having been introduced with the object in view either to prevent conception or to overcome sterility, and erotic causes could also be excluded. She was twenty-five years old at the time of examination, had married at eighteen and was childless. Soon after marriage she had a period of amenorrhea for three months, considered herself pregnant and had what she regarded at the time as a miscarriage. She stated that curettage was not deemed necessary. She did not become pregnant after that. Her menses began at fifteen and were regular prior to her miscarriage, were painless and of four days duration. Dysmenorrhea set in soon after and two years later she sought relief from both pain and sterility and underwent a curettage and dilatation of the cervix. Neither of these symptoms was improved. In June, 1915, she presented herself at the gynecological clinic for advice. Examination revealed a fairly nourished individual, one who might be assumed to be in good health.

The cervix was small, the external os moderately open, the body of the uterus sharply anteflexed and slightly enlarged. On bimanual palpation I was surprised to elicit a sense of *crepitation* which on repeated examination was unmistakable. This sensation was confirmed by my associates of the clinic. The uterine sound entered the external os readily but met obstruction at about the level of the internal os. With increased flexion of the sound the internal os was passed and a very distinct grating was both felt and heard. It was evident we were dealing with a foreign body within the uterus the exact nature of which could only be conjectured. There was no history of any surgical accident and

the patient denied having resorted to devices for contraceptive or other purposes. We decided to have the abdomen roentgenographed. In the plate there was not the slightest suggestion of a foreign body in the region where the uterus should be. The negative roentgen-ray picture while excluding any metallic fragment nevertheless did not exclude very young bone as for example a fragment of a fetal extremity. The sense of crepitation was so positive that I determined to dilate the cervix in the endeavor to remove the object. This was easily done and with the curette I removed three fragments of what proved to be a fetal bone. Two of these were very small while the largest was nearly an inch long by one-tenth of an inch thick. The uterine cavity was slightly dilated. There was thick dark blood which appeared as though it had been confined to



Cross section of foreign body showing young bone-structure.

the uterine cavity for some little while. The obstruction was in all likelihood at the internal os.

The dysmenorrhea appears to have been relieved. The patient has had two normal menstrual periods since and on examination there is complete absence of the crepitus revealed at the first examination. It will be interesting to note whether the patient will become pregnant again and how soon.

Epicrisis: The case calls to mind the very great rarity of retained skeletal fragments of fetuses in utero in spite of the prevalence of miscarriages at various stages of gestation. Lithopedia are by no means unknown but retention of an isolated shank of bone is, in the experience of the writer at least, a very uncommon occurrence. The fragmentation of the bone was in all probability due to repeated contractions of the uterine muscle in an attempt to expel it.

261 CENTRAL PARK WEST.

THE LATEST METHODS OF EXAMINING
THE GENITO-URINARY TRACT WITH
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The title of this communication may give the impression that I have some new technic to advocate in the roentgen examination of the genito-urinary tract; if so, I wish to state that much the same methods are used to-day as were in vogue ten years ago, the advancements being in the improvement of the apparatus whereby we are able to obtain more satisfactory roentgenograms, in the ability to more accurately interpret the shadows obtained and in "team work" with the cystoscopist.

Given a case with symptoms suspicious of a calculus, what *are* the latest methods of examination?

One of the most important is the proper preparation of the patient. My recommendations are: A dose of castor oil two hours after the evening meal, the night before the examination; on the following morning a breakfast of coffee and roll at 7:00 A. M.; at 10:00 o'clock, one or two colon flushings until the return is clear, the abdomen relaxed and the bowel free from gas. The examination to take place about 1:00 P. M. It is especially desirable to rid the colon of all gas, for the dark shadows produced by it obscure the light kidney outlines and overshadow small or soft calculi in the urinary tract; the thorough cleansing is also necessary on account of the frequent complicating shadows cast by bowel contents such as hard fecal masses or enteroliths.

When the patient presents himself for examination it should be explained that in order to obtain satisfactory roentgenograms all motion of the body must be suspended during the exposure. He is told that it is essential to "hold his breath" in full inspiration while the tube is lighted—inspiration is suggested in order that we may take advantage of any downward excursion of the kidney and obtain its shadow as far below the free border of the ribs as is possible. It is always well to rehearse the procedure once or twice before making the actual exposure. It is also explained that, in order to place any value on our negative diagnosis, the entire tract *must* be covered as it is well known that clinical symptoms frequently occur on the side opposite to the one where the calculus is found.

The patient is then placed in the prone position on a special stereoscopic table. Attention is first given to the kidney opposite the side which is giving the most clinical symptoms; this is done in order

to lessen the chance of obtaining unsatisfactory roentgenograms of the affected side, as there is great liability that the patient will not carry out his part with accuracy during the first exposure.

A tube that is commonly called "soft," but of good penetration, is properly adjusted in a stereoscopic tube-stand to which is attached a contracted diaphragm and cone with an outlet of five inches. The special cone lined with corrugated lead, suggested by Doctor Hickey of Detroit, is used, as it seems to control and "cut off" many of the secondary rays which so often are the cause of "flat" plates and blurred detail. The tube is centered between the eleventh and twelfth ribs of the side to be examined and tilted enough to just escape the free border of the ribs. An aluminum cup three millimeters thick is attached to the outlet of the cone; this acts both as a protection to the patient—filtering out the dangerous soft rays—and as an excellent aid in obtaining efficient compression.

Having previously properly centered the tube to the plates, firm compression is made, the patient aiding the slipping of the cup-covered cone under the free border of the ribs by full inspiration. A soft cotton pad placed under the cup will often aid in obtaining, without protest from the patient, full and complete compression; this is most essential in order to obtain good kidney outline.

When the apparatus is properly set, the patient is amply warned and given time to take and hold the full inspiration. An exposure is quickly made of fifty milliamperes for about five seconds. This procedure is then repeated as we should obtain at least two roentgenograms of each region examined. The same technic is then followed on the opposite side.

We then proceed downward, making roentgenograms of the ureteral region, the same method being used except that the central ray is directed at right angles to the center of our plate, both ureters being covered by one exposure.

When we come to the bladder and lower ureteral region it is customary to routinely make a stereoscopic examination—this is done in order to rule out the shadows which so commonly occur in the pelvis and which might be mistaken for calculi in the urinary tract. The method of procedure is as follows: Having tilted our tube toward the feet of the patient sufficiently that the cup on the cone will slip just beneath the symphysis pubes, the tube is centered to the middle of the plate; the tube holder is now moved $1\frac{1}{2}$ inches to the right of the center point and the cone is tilted slightly toward and to the center of the plate. Everything being in readiness, the patient is placed on the table and

firm compression is made, followed by about the same exposure under the same conditions as used on the kidney regions. The exposed plate is then automatically shifted to a protected position, at the same time one unexposed slips under the patient; the tube is again shifted $1\frac{1}{2}$ inches to the left of the center point and the cone again tilted toward the center of the plate, followed by compression to correspond to the amount used with the first exposure, this having been previously recorded on a sliding scale on the tube stand; the second plate is now made. This, then, is the complete method of making the preliminary examination.

If the results are positive, the suspicious shadow being apparently within the kidney, the confirmatory examination, which should always be made, is taken stereoscopically; this method enables us, with few exceptions, to determine definitely the location of the calculus within the kidney. If, however, the shadow of the possible stone is seen to be considerably outside of the normal zone of the kidney pelvis and the surgeon desires more accurate information as to its location, or where necessary to exclude enteroliths, gall stones, calcified costal cartilages and glands, or skin defects such as warts and moles, then the use of some solution of a silver salt or thorium injected into the pelvis of the kidney through the ureter is called for and the roentgenograms when taken stereoscopically will give the exact relation of the kidney pelvis to the suspected shadow.

This method is also called for in investigations for ureteral kinks, hydro- and pyronephrosis, etc. Doctor Manges of Philadelphia has suggested that all special roentgen investigations of the ureters and kidney pelvis by means of styletted or roentgen-ray catheters or with injections of solution of drugs that cast shadows, should be made in conjunction with direct observations on the fluoroscopic screen, that the passage of the catheters or the injection of the solutions be entirely under the visual direction of the roentgenologist. Knowing that most of the disastrous results from these procedures are direct trauma to the interior of the kidney pelvis by the catheters or from the solution being injected into the renal pelvis under too high a pressure, the method certainly is appealing.

If the shadow lies above the pelvic brim within the normal line of the ureter a stereoscopic confirmatory examination should be made; this will give us most accurate information as to the exact size, shape and location of the suspected calculus. Should there be any question, however, as to whether the shadow lies within the ureter or not, then the "stereo" examination should be repeated

after a styletted or roentgen-ray catheter has been introduced.

Below the brim and within the bony pelvis, we must not place too much dependence on the fact that the suspected shadow is seen to be out of line of the normal ureter; the ureters may lie in abnormal positions. It is in this locality that the catheter is most frequently required, for we often have to differentiate a calculus from many adventitious shadows, the most common of which are cast by fecal concretions, spiculae of bone, small calcareous bodies called phleboliths, folds of intestines, foreign bodies, drugs in the intestinal tract and calcified arteries or glands.

Experience has taught us that even when the catheter is used the case must be examined stereoscopically as the suspected shadow may lie directly in the line of the ureter and a single flat plate would be deceiving.

Should surgical measures be contemplated it is always well to have a roentgen examination made within twenty-four hours of the operation, since a calculus is very apt to change its position, especially after the manipulation incident to catheterization.

From the above description of our technic it is readily seen that to properly examine the genito-urinary tract considerable time and attention to every detail is required; lack of these are responsible for many errors in the roentgen diagnosis.

Braasch and Moore of the Mayo Clinic in a recent communication state: "It is doubtful if an accurate diagnosis of stone in the ureter can be made from roentgenographic data alone in more than 60% of cases." This low figure cannot, in my judgment, be accepted as final. Possibly such a large percentage of failures is due to the fact that the roentgenologist is unable to give sufficient time and personal attention to the detail necessary in these cases, inasmuch as he frequently has in his department, I understand, as many as sixty patients to examine in one day. In Cabot's 127 cases recently published, eight, or 6 per cent., were persistently negative; this he believes is more favorable than will be found in a larger series where he estimates that the roentgen-ray as used at the present time in competent hands fails to detect stones in between 10 and 15 per cent. of the cases.

New York roentgenologists such as Caldwell, Cole, Jaches and LeWald do not concede failures in any such high percentage. Baetger of Johns Hopkins, however, states that his negative findings in positive cases amount to about 25 per cent.

While I am not in position to give accurate figures, my experience would suggest failures in about

5 per cent. of renal and ureteral calculi and about 10 to 15 per cent. in vesical calculi.

What, then, are the causes for such failures and what means must we use to overcome them? The question of imperfect technic has already been taken up; next in order is error in interpretation—this may be due to lack of careful study of the finer shadows, which only experience can overcome, or to the location of the calculus the shadow of which may overly some of the bone structures; here the stereoroentgenograms are of extreme value; when examined in the stereoscope the stone is seen to stand out well away from the bones.

As the density of the shadow of a calculus is in direct proportion to the amount of calcium it contains it is obvious that stones of pure uric acid, which have a very low atomic weight, will not be shown by the roentgen examination. This is well illustrated in vesical calculi where a large proportion of cases consist of pure urates; this accounts for the higher percentage of failures in this lesion, although we believe, where necessary, the difficulty can be greatly overcome by inflating the bladder with air before making the exposure.

It must be remembered that the number of cases where we fail to show the calculus on account of its composition may vary in different localities and this variance may explain the discrepancies in the percentages of failures. That we do have in this locality an occasional calculus of pure uric acid there can be no doubt, but this fact should not be used to cover up errors in interpretation or improper technic.

CONTROLLING THE BOWELS AFTER RECTAL OPERATIONS.

General surgeons are divided in their method of controlling the stools after rectal operations. Many purge the patient, liquefy the feces, and keep him busy and miserable through his frequent visits to the toilet, while others administer an opiate and tie up the bowel for days, procedures to be condemned because the *former* insures continuous irrigation and favors infection through soiling the field with fluid feces and the *latter* leads to excruciating pain and tearing open of the wound when accumulated, dry, and nodular fecal masses are evacuated.

The writer keeps his patients on a regular diet and does not order a laxative unless the stools are hard, when he prescribes mineral oil, fruit, or other laxative in small doses to soften but not liquefy them, for at one sitting semisolid pieces are evacuated without pain or injury.—S. G. GRANT, in the *Medical Record*.

BACKACHE IN GENITO-URINARY DISEASES.*

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Both organic and functional genito-urinary lesions may cause pain in the back.

1. ORGANIC LESIONS.

Before proceeding it may not be amiss to recall that the nerve supply of the kidney is derived from the renal plexus, which communicates or associates with other important plexuses notably the spermatic.

Further there are two areas which are more or less defined and which are known as the anterior and the posterior renal pain areas. The anterior area is at a point about two inches below and internal to the tip of the 9th costal cartilage.

The posterior area is at the angle formed by the last rib and the erector spinae group of muscles.

Perinephritic Abscess. 1. Hematogenous or primary variety. When the abscess is hematogenous in origin, as in the course of scarlet, typhoid, tonsillitis, pneumonia, etc., there is a distinct pain symptom.

There is pain in the back in the kidney region which is generally mild at first and sooner or later, according to the type of infection, gets severe. The pain may radiate to the shoulder or arm, but frequently it passes down to the scrotum or labium. This pain in the post-renal region is generally increased by movement such as violent respiration, coughing, and sneezing.

With the pain go the other symptoms—tenderness on palpation in the posterior renal region and even the anterior fever, rigidity of the thigh on the same side, psoas contraction, etc.

2. Secondary Abscess, by *contiguity* from the gall bladder, appendix or the kidney proper.

The pains are the same as those of the primary type except that they are superimposed on the symptoms of complicating gall-bladder, kidney or appendix disease.

Renal Calculus. Pain is present in over 70% of the cases of renal calculus and is felt in the posterior renal area and if the pain is severe it even is felt in the anterior renal area.

The pain in renal calculus may be one of three varieties.

1. Fixed or constant; 2. Renal colic; 3. Referred pain.

* Read before the Yorkville Medical Society of N. Y., May 17, 1915.

1st. Fixed pain. Usually in the posterior renal, or so-called costo-muscular angle, there is a constant backache, varying in intensity. This backache is usually increased by movements such as jarring, walking over rough roads, jumping, motoring, etc. According to Fenwick these patients have backache and discomfort on sleeping on the affected side; he believes it to be due to inflammation of the renal pelvis. The backache in these cases is sometimes so severe that the patient in walking bends toward the diseased side and slightly flexes the thigh so as to relax the psoas, a characteristic attitude.

The pain varies with the size, number, shape and smoothness of the stones and the presence or absence of pelvic involvement.

Large stones may give a little dull backache.

Small stones in the calyces a little more ache than the above.

A rough stone in the pelvis gives the worst pain.

2d type. Renal colic. This commences as a pain in the anterior or posterior renal area, in the latter case as a backache, and shoots down along the ureter and is radiated to the testicle or labium. It is not a backache for long, but there may be a history of fixed backache followed by a severer backache and then the colic.

3d type. Referred pain. There is always a history of fixed backache, and later referred pains in testicle, labium, bladder and even the other kidney. This last symptom is important and is known as the reno-renal-reflex.

Perinephritis. This is of two types: 1. sclerotic; 2. fibro-lipomatous. Both are the result of chronic inflammation of the kidney notably pyelonephritis, pyonephrosis, calculus and tuberculosis. Both types cause backache, varying in severity with the primary disease.

Adrenal Tumors. Chief among these is the hypernephroma. Here there is a severe backache when the tumor is large, and very often pains are referred along the nerves affected by the infiltrating growth. Of course the chief symptom is the hemorrhage and not the pain.

Renal Tuberculosis. Three types are recognized. 1. miliary; 2. ulcero cavernous; 3. massive. The pain symptom is alike in all three unless there is a large amount of perinephritis as in the massive type and many adhesions, when the pain is severe.

There is, as a rule, little or no backache in miliary and ulcero-cavernous renal tuberculosis; occasionally there is a dull ache. The patient says he feels easier when not lying on the affected side.

Aseptic Pyelonephritis. 1. Acute retention pro-

duces a dull backache, according to Guyon and Albarran.

2. Excretion of irritants as turpentine, santal, copaiba, bichloride of mercury, etc., also causes dull backache, bilateral as a rule.

3. Chronic urinary obstruction such as stricture, enlarged prostate, etc., causing back pressure on the ureters and pelvis and finally a pyelonephritis, causes thus a dull bilateral backache.

Bacterial Pyelonephritis. 1. primary; 2. secondary.

1. Primary or hematogenous pyelonephritis may be (a) hyperacute or fulminating; (b) acute; (c) subacute or chronic. All of these types are marked by pain in the back varying from an ache to the most violent pain according to the severity of the process. We must differentiate these pains from those of perinephritic abscess, but fortunately cystoscopy and catheterization of the ureters do this as a rule.

The chronic cases of this disease have mild backache with vesical symptoms and are very often erroneously treated for cystitis. Unless catheterization of the ureters is done and proper treatment instituted in these chronic cases, we are allowing a severe chronic disease of the kidney to continue much to the detriment of the patient.

2. *Secondary pyelonephritis.* This follows chronic diseases of the bladder or urethra, enlarged prostate, surgical operation on bladder and lower urinary tract, and instrumentation and is often called surgical kidney. The infection is often superimposed on a chronic aseptic pyelonephritis, spoken of above.

(a) Acute cases show among other symptoms pain in the back usually more marked over one kidney.

(b) The chronic cases are more insidious. There is usually a slight renal aching, but the kidney is not tender as a rule. The ache, together with the history of prostatic, urethral or vesical symptoms in one who seems to be about to enter the state of chronic invalidism, should be a warning to have the primary lesions treated. Here only a very thorough examination can disclose the true cause of the ascending process.

Pyelitis. This is a frequent and important cause of backache. It causes a dull ache in the chronic cases, and a sharper posterior pain with high fever in the acute cases.

Pyelitis of Pregnancy. This is usually a pyelonephritis and gives as a rule a very severe unilateral backache. The entire picture is often acute, but the

cases vary to the chronic form which gives backache as a symptom.

Pyonephrosis, due to stone, movable kidney, kidney of pregnancy or any ascending pyelonephritis.

Intermittent pain at the onset of an attack is usually pronounced. It is a constant, heavy, boring pain and is usually severe when the ureter is blocked and the sac is thus closed. When the pyonephrosis is open and the pus drains, there is often complete absence of backache.

Hydronephrosis. 1. Early, before very great enlargement, there is a constant dull aching at the costo-vertebra angle.

2. Late, when there is a tumor formation, there is either: A constant closed hydronephrosis giving a dull ache in the posterior renal area; or, when intermittent, pain like those of Dietl's crises of movable kidney.

Abscess of the Kidney. This gives severe pain over the renal area of the affected side.

Chronic Nephritis with Pain. This is often called neuralgia of the kidney. It is due to chronic Bright's Disease, follows renal stone or other renal trauma. There is a thickening of the renal capsule with adhesions or fibrous perinephritis.

Pain is usually in the posterior area of the affected side, and may be spontaneous, constant and unaffected by movement; or there may be attacks of colic.

Tumors of the Kidney. Pain is a common symptom and usually shows as a backache. There may be ureteral colic due to the passage of clots.

Backache in kidney growth is due to tension within the kidney capsule or is caused by engorgement of the kidney, or hemorrhage into the growth. The backache is usually constant and is unaffected by movement and is only temporarily relieved by drugs. When the growth spreads beyond the kidney, the pain is then due to nerve involvement other than the renal plexus and may even take on the character of intercostal neuralgia.

Growths of the renal pelvis, cause pain as above, but more often colics.

Movable Kidney. Pain felt usually in one of two places, or both: 1 The angle formed by the last rib and the erector spinae muscles; or 2 about two inches below and internal to the ninth costal cartilage. The anterior pain is more frequent than the posterior. Pain often comes on in Dietl's crises.

Misplaced Kidney, often called pelvic kidney. Israel says "this gives pain in the corresponding lumbar region and occasionally simulates renal stone."

Injuries to the Kidney Without External Wound. Pain pointing to an injury of the kidney radiates

along the ureter, with retraction of the testicle. Pain is severe, particularly so with hemorrhage.

Pain in the back is dull, heavy and deep-seated, and is increased by movements such as coughing and sneezing.

Other Lesions of the Kidney. Dermoid, polycystic kidney, solitary cysts, and hydatid cysts, perirenal growths, bilharzia infection, actinomycosis and syphilis of the kidney may cause backache.

Tumors of the Bladder. These may give posterior renal pain if near the ureteric orifices.

Stricture of the Urethra. In tight stricture where muscular effort is necessary to empty the bladder, the back pressure may force the ureters and dilate them and then give the patient unilateral or bilateral backache of pyelonephritis, etc., from ascending infection.

Prostatitis. Chronic prostatitis as a rule gives backache only when associated with renal infections, as pyelonephritis, pyelitis, etc., or if the patient is neurotic.

Most medical men have, it seems to me, the erroneous idea that prostatitis, as such, causes a backache.

Adenoma of the Prostate. There is occasionally pain in one or both kidneys on micturition due to dilation of the ureters and back pressure on the pelvis of the kidney.

Malignant Tumor of the Prostate may cause pain in the sacroiliac synchondrosis.

Seminal Vesiculitis. Acute type. Pain sometimes in the sacroiliac synchondrosis and low down in the lumbar region.

2. Chronic type. Symptoms chiefly sexual and neurotic. Pain occasionally in the sacro-iliac synchondrosis and also referred pain low down in back.

Epididymal and Testicular Conditions practically never give backache.

FUNCTIONAL OR INORGANIC CONDITIONS

Masturbation. Often the patient complains of severe pain in the back, and back weakness. Masturbation should be thought of in every patient complaining of backache where no physical signs can be found.

Interrupted Intercourse or Conjugal Onanism. This practice, continued long, gives a train of symptoms, chiefly reflex, from the spermatic to the renal plexuses, including backache.

Sexual Excesses may also cause backache.

Neurasthenia. Neurasthenia with almost any genito-urinary condition may complain of backache. Attempts at intercourse in a case of *ejaculatio pre-cox* may produce the most violent backache for 24 hours.

CONCLUSIONS.

1. In genito-urinary affections backache is a frequent symptom.
2. Kidney conditions cause more backache than any other genito-urinary condition.
3. The frequency of backache as a symptom diminishes as we descend the urinary tract.
4. A psycho-sexual neurotic may have backache with almost any genito-urinary condition.
5. With pain in the back as subjective evidence, and with cystoscopy, ureteral catheterization, kidney function tests, pyelography, wax-tipped ureteral catheters and X-ray pictures, to provide objective evidence, we can convict or acquit the genito-urinary tract as the malefactor, in nearly all cases.

LATENT APPENDICITIS AND "INDIGESTION."

The most frequent cause of reflex indigestion is appendicitis, frequently associated with Lane's kink. In many cases there are no typical symptoms, the patient will deny any pain in the appendiceal region and there is no rigidity of the abdomen. Sometimes we may aid ourselves by inflating the colon with air and then elicit pain by pressure over the appendiceal region. In females a vaginal examination sometimes aids in the diagnosis. The x-ray is of much help in some cases, especially when the appendix is retrocecal. When we find a stagnation of the bismuth meal in the region of the caput coli, and often an appendix filled with bismuth which does not empty itself, we may feel sure that there is a pathological condition of the appendix. These vague cases of appendicitis frequently produce marked gastric symptoms, nausea, heartburn, fullness and distress after meals, and the patients are often treated for hyperacidity or pylorospasm, both of which may be present; but they are only reflex symptoms and the patient will get no permanent relief from drugs.—SAMUEL McCLARY, in the *Pennsylvania Medical Journal*.

APPENDICITIS WITH DISTANT SYMPTOMS.

Demo, the French surgeon, relates the particulars of six cases in Italian literature, and two in his own experience, in which reflex nervous phenomena,—kidney colic, pain during micturition, bladder tenesmus, cystalgia, smarting in the urethra or priapism,—were the first signs of trouble which later proved to be appendicitis. The inflammation in the appendix evidently acted on the vesical, renal, hypogastric, or pubic plexus, inducing functional disturbance.—P. D. PEABODY, in *The Journal-Lancet*.

A BOOT FOR INJURIES INVOLVING THE WRIST.

BURTON A. WASHBURN, M.D.,
PADUCAH, KY.

I am having good results in handling fractures, dislocations and wrist drop, with this boot, which is here illustrated as applied to a case of fracture.



Fig. 1.

dislocation and wrist-drop. The palm section is oval, fitting into and covering the palmar surface. It has a steel strap attached that fits into the arm



Fig. 2.

cuff, and can be shaped to suit any case. In figure 2 the palm section is removed. It illustrates the

complete control of the hand and joint regained after the use of this boot. Previous to applying this boot the contraction was so great that the relationship of the hand to the arm was a right angle.

I have used this boot in a great many cases and I find that it meets the needs in supportive treat-



Fig. 3.

ment better than any other I have ever used. It is not expensive, it can be made quickly, it looks well and it gives the patient great comfort.

RADIUM IN EPITHELIOMA.

Radium used on squamous-celled epithelioma of the skin gives excellent results. Depending on the depth of involvement slight variations must be made as regards the length of application; screening the apparatus, etc. Where there is a good deal of thickening of the edge of the ulcer, or it tends to be fungating, preliminary curettage hastens the cure, the radium plaques being applied a few hours later. Prolonged exposures using heavily screened apparatus which emits only the harder beta and gamma rays, should be given, and healing takes place with a minimum of inflammatory reaction—W. H. B. AIKENS in *The Canadian Practitioner*.

THE EXCISION OF ANAL FISSURES.

Fissures should not be excised because considerable time is required, infection frequently follows, and the results are unsatisfactory. This procedure consists in trimming the edges of the rent and closing the wound by sutures or permitting it to heal by granulation and the operation is not effective except when accompanied by division or division of the anal muscle.—S. G. GANT, in the *Medical Record*.

A NEW METHOD OF APPLYING PURE ACID CRYSTAL.

AP. MORGAN VANCE, M.D., F.A.C.S.,
LOUISVILLE, KENTUCKY.

Uniform cauterization by means of the pure acid crystal has always been difficult of accomplishment, particularly when applied to mucous surfaces, e. g., within the mouth, the nose, the vagina, the rectum, because of inability to properly hold the crystal within the grasp of forceps. In the cauterization of lesions, such as wounds, ulcerations, etc., situated upon cutaneous surfaces, similar difficulties are not so apparent, although accidents have occurred, the crystal getting lost below the collar or possibly "flying" into an eye.

After the removal of a diffuse papilloma from the roof of the mouth recently, desiring to cauterize the base with the pure acid crystal, a method was adopted which so far as I am aware has not hitherto been described. Remembering the manner in which

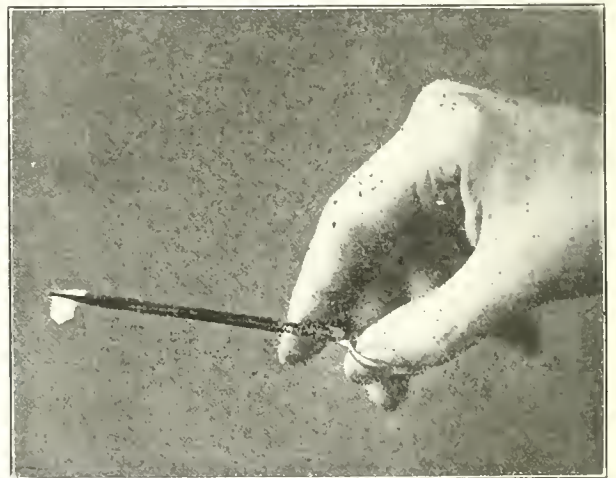


Fig. 1.

the old country negro carries his eggs, viz., placing them in the center of his handkerchief and bringing its corners together and tying them, the idea occurred to me that a similar plan might be utilized in holding the acid crystal.

Placing a large crystal of pure monochloroacetic acid in the center of a piece of sterile gauze cut to about the size of a nickel, the corners were brought together and grasped with small forceps, as shown in the accompanying illustration. With this simple device the base of the papilloma was effectively cauterized without the possibility of the crystal being released during the procedure. The deliquescent nature of the acid is so marked that the full effect was thus secured through the gauze even without additional moisture.

This procedure is applicable, regardless of the anatomical situation of the surface to be cauterized, and obviously possesses manifold advantages over the methods heretofore suggested.

Acid solutions are oftentimes ineffective, because of rapid deterioration; admixture with the secretions is unpreventable; the strength of the solution reaching the surface to be cauterized is always uncertain.

By using the pure crystal according to the plan herein described, it is impossible for the crystal to free itself from the gauze container; the application can be made exactly where desired; the effect is uniform; the ultimate result is certain and satisfactory.

PREPARATION FOR ANO-RECTAL OPERATIONS.

The common practice of surgeons purging patients and deluging the colon before rectal operations courts annoyance and infection, since the field of operation will be bathed with fluid feces, which delays the work, contaminates the wound, soils the dressings, and makes the patient uncomfortable afterward.

For *fistula, hemorrhoidal, fissures, polypoidal*, and other *minor operations* but a few moments are required to prepare the patient, which is done by having him inject a glassful of soapsuds into the rectum to bring away solid feces, after which the mucosa is mopped over with peroxide of hydrogen or other antiseptic, procedures which forestall many annoyances. When the bowel is to be amputated or resected for rectal procidentia, stricture, tuberculosis, or cancer three or four days' preparation is required and the gastrointestinal tract is first cleansed by catharsis and colonic ichthyol 1 per cent. irrigations, and then tied up with an opiate or astringent which insures a dry field of operation.

The parts are never shaved, except where *sutures* are used and primary union is anticipated because the hair stubs cause great annoyance.—S. G. GRANT, in the *Medical Record*.

ROENTGEN-RAY EXAMINATION OF THE ALIMENTARY TRACT.

In every examination of the digestive tract, both roentgenoscopy and roentgenography should be employed. They should not be regarded as independent competitive methods but as complementary parts of one method, for exclusive reliance upon either alone is likely to result in overlooking some important feature of a case. Roentgenoscopy is particularly necessary in examinations for gastrojejunal ulcer.—R. D. CARMAN, in the *American Journal of Roentgenology*.

A MEANS OF CONSERVING NUTRITIVE VALUES IN HIGH LYING FECAL FISTULAE.

REGINALD H. JACKSON, M.D., F.A.C.S.,
MADISON, WIS.

The formation of a temporary artificial anus or fecal fistula has undoubtedly served to save many lives in that class of desperate cases of intestinal obstruction where the help of surgery is sought as a dernier resort,—cases in which the life of the bowel is questioned and yet for good reasons the surgeon hesitates to resect. Occasionally in such cases it is impossible for the surgeon to avoid making the artificial anus in a rather high lying loop of the ileum, which results in a rapid loss of strength and marked emaciation in the patient.

Recently in such a case, where it seemed that the patient was steadily losing ground, a marked change for the better was noted on adopting the following procedure: The nurse was instructed to save all the dressings which were saturated with the fecal discharge (which was profuse, necessitating change of dressings every three hours). These dressings were allowed to soak in a bowl of salt solution and then passed through a wringer. The fluid thus secured was then administered per rectum by the drop method.

LABORATORY VS. CLINICAL DETERMINATIONS.

Although I am as much an advocate of laboratory methods as the most scientific younger surgeon, yet they should not replace those powers of observation which are the great asset of the medical man. I fear a tendency to do so, for the recent graduate dares not diagnose a fracture without x-rays, a typhoid fever without a Widal, syphilis without a Wassermann, and so on. We cannot always carry a laboratory or hospital appliances about with us, so we should not depend too much on the use of mechanical means in diagnosing disease and should not let our powers of observation atrophy. Time, no doubt, will remedy this state of affairs and things will bear their proper proportion to one another.—FRANCIS J. SHEPHERD, in the *Canadian Med. Assn. Journal*.

JOINT CONTRACTURE IN OSTEOMYELITIS.

In nearly all forms of osteomyelitis there is a marked tendency toward contracture deformity at the neighboring joints; suitable splints should be provided. Especially at the ankle or knee a splint will often prevent drop foot or a knee contracture.—H. W. ORR, in *The Medical Herald*.

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WALTER M. BRICKNER, M.D., Editor

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A SURGEON'S PHILOSOPHY.

"Know the truth, and the truth shall make you free" is an ancient injunction, yet despite its antiquity, and the countless generations of learned men who speculated upon it, its full significance was but dimly conceived until men like Virchow, in command of hosts of facts, loosed themselves from the toils of metaphysics and with the aid of scientific method, led humanity along the path toward that freedom which spells loving service in all walks of life, peace, health, and happiness. Such is the impetus to thought and the motive for action with which Morris' "A Surgeon's Philosophy"* is apt to inspire us. For it is the scientific surgeon *par excellence* who is to work out man's salvation, by beginning not with the soul and working downward as in the time-worn cults and creeds, but with the tangible, the physical, the things that he can see, as a basis. Actuated by a broad sympathy and a love of his fellow, he will apply the knife to the rank growths of superstition and fraud, and lay open to the health-giving sunlight the tiny shoots of truth.

With characteristic directness the surgeon-philosopher lays the sharp edges to psychoanalysis and Christian Science. "Christian Science, Freud, alcohol and caffeine are all alike," says he, "in the sense that they relieve the stress of one morbid condition by introducing another morbid condition in its place, the latter being more agreeable." The

Froids, as the author calls the followers of Freud, (from "fraud" and "eidos") disregard the physical entirely. For example, they represent a psychosis like dementia precox as a conflict in the mind, making it a metaphysical problem; the surgeon or bacteriologist, puts it on a purely physical basis, assuming that toxins were injuring the cells of ductless glands, thus allowing an escape into the circulation of certain morbid secretions, which eventually deprive cerebral lipoids of their oxygen-carrying power.

Morris, by relieving many a psychotic of his involutioned appendix has brought to a close his hysteria, bad dreams, and other symptoms. The Froids would have attempted a cure by suggestion, but the symptoms would have returned when the suggestion was withdrawn. His broadmindedness enables him to see, however, that even in fads like osteopathy, Christian Science, and other cults that find a following among the neurotics, there is often a thread of truth, even as "the medical profession learned the use of lobelia from the Indians, from a shoemaker the operation for vesical calculus, from a postmaster the method for sounding Eustachian tubes, from a monk how to use antimony."

His timely warning to psychiatry that it must first go over to psychology and bacteriology before it can be returned as a science is well worth heeding. Psychology, indeed, is even now taking charge of the feeble-minded. Because the psychiatrist must work arbitrarily from symptoms, he is apt to speculate. "In the field of psychotherapy," says Morris, "we may look for as much sonorous high-class confusion in the next few years as we had in psychology in the last twenty years.

"This is a comical world, to be sure, with its inconsistencies and hypocrisies, but the satisfaction of men who are seriously and happily engaged in scientific study and welfare work is a perennial inspiration." And there is plenty of work for the scientific surgeon of the twentieth century. The domestically unhappy, the anarchist, the militant suffragist, the political agitator, yes, and even the criminal, will need surgical treatment since they are the people in whom physical punctuation is at fault—the colon is often obliterated by bacilli, their terminal facilities are often sorely in need of revision, their periods of rest, nutrition, and recreation, do not recur with the proper rhythm. Their toxins are not oxidized.

"What is known as frigidity in both sexes is now understood to be due to hypothyroidism in many cases." What a responsibility for the surgeon and bacteriologist of the future!

* A Surgeon's Philosophy. Tomorrow's Topics Series. By Robert T. Morris, M.D., Doubleday, Page and Company, 1915.

"Many thousands of cases will be removed from the divorce courts of tomorrow by the treatment which goes with attention to fibroid appendices, pyloric adhesions and sagging colons, or by fixing loose kidneys and correcting dental defects." "How many cases are there of marital infelicity dependent upon inefficient adrenal glands!" Many an unhappy marriage might be averted if the prospective bridegroom, instead of consulting a photograph, secures a radiograph, and notes perhaps the presence of a narrow costal angle or a gastro-colic ligament at the level of the fourth lumbar vertebra. We do not think such a one will go, to the minister first to pronounce the nuptial blessing, but to the surgeon, to save him from the modern Xantippe. Morris assures us that he has often told a patient that he or she will live happier with wife or husband after the operation, and that these same patients often returned to tell him that he had predicted truly. There will be needed no legislation for divorce, since the husband, beset by a nagging wife, will not blame nor make accusations of incompatibility, but full of sympathy, will consult a surgeon, who will perhaps ask for a radiograph of the viscera. It may happen that the wife is a victim of splanchnic neurasthenia. In fact, all malefactors, as well as those who are not socially efficient, the idle men and women—those who instead of being producers, would "steal their ride" on life's journey—will not merit censure until the able diagnostician shall have found the cause, and skill shall have removed it. Then, perhaps, man shall enjoy his work like the red squirrel, and shall "so live that he can die laughing."—R. B.

HERNIAE AND DAMAGE CLAIMS.

In the June, 1915, issue of the JOURNAL we took the stand that the ordinary types of abdominal hernia are not traumatic in origin, that the "strain" or "fall" to which they are so often attributed cannot properly be considered their cause, and that such injury or effort remotely or immediately preceding the discovery of a hernia should not be compensated under accident or workmen's compensation insurance.

In the editorial referred to we presented arguments why herniae cannot properly be considered traumatic in origin: and we referred to the article on The Relation of Hernia to the Workmen's Compensation Law by Moschowitz as supporting our contention. We are led to revert to the subject now, not only because it is an economic question on which the profession should take a stand, but also because we have recently noted, in *The Virginia*

Medical Semi-Monthly (September 24, 1915) an address delivered before an association of railway surgeons by J. M. Salmon, of Ashland, Ky., in which he expresses the same opinion as that we hold. His argument is so clearly and sharply put that we think it worth quoting here:

It is well known that normally the peritoneal process, which invests the testis and cord in the male and the round ligament in the female, is obliterated before birth. Normally, the internal abdominal ring is only large enough to transmit the spermatic cord or the round ligament. Normally, there is no pouching or sacculation of the peritoneum opposite the internal ring. The contention that inguinal hernia results from sudden traumatism rests, therefore, upon the assumption that the traumatism has caused the sudden separation of the fibers of the abdominal muscles at the site of the abdominal rings, the sudden formation of a distinct peritoneal pouch large enough to contain the protruded viscus or viscera and the sudden forcing of this pouch with its contents into the inguinal canal, tearing asunder the filaments of the ilio-inguinal and ilio-hypogastric nerves and rupturing the network of overlying bloodvessels. It is even contended that all this may occur with little or no inconvenience or pain, and that the victim may be able to walk a distance of five miles (as alleged in a recent case) after the occurrence of the "rupture."

To a reasonable mind, this contention must seem absurd. Men have fallen from great heights, from bridges, parachutes, stacks and aeroplanes and, while their bodies have been terribly mangled and many bones broken, I know of no instance where inguinal hernia has resulted from such accident. Yet we are asked to believe that hernia may result from a fall of two or three feet from the platform of a coach.

It is alleged that hernia occurs as the result of increased abdominal tension, as in heavy lifting, sudden muscular strain and the like. If this be true, why are not *all* ruptured who lift heavy weights,—*all* who fall from trains,—*all* who are thrown violently down by the jar of a collision?

Clinical experience and scientific investigation have demonstrated the fact that in the absence of congenital defect, either in the form of a preformed sac, an open funicular process or an abnormal opening in the abdominal wall, inguinal hernia does not occur.

Salmon refers to R. Hamilton Russell's monograph on the congenital origin of inguinal and femoral herniae, and quotes the following authors:

W. B. Coley states that "the great increase in our knowledge as the result of the large number of operations for the radical cure of inguinal hernia that have been performed during the last two decades has proved that, in the vast majority of cases, hernia is a disease rather than an accident." Again, the same author says that "of 4,780 cases of hernia in adult males over fifteen years of age, 3,102 stated that the rupture occurred without any known cause." There were, in other words, 3,102 potential damage suits which lacked only the coincidence of a railway or industrial accident.

Tillmans says in this connection, "Traumatic hernia is not true hernia. The hernial sac, that is, the true hernia, is always developed gradually, although an injury may, of course, act as part of the exciting cause."

Sultan says: "In the critical examination of a casual relation between hernia and accidents, we must remember first of all, that a hernia, complete in all its parts, can never arise at the moment of an accident, or by a single augmentation of the intra-abdominal tension, be it ever so great."

Both in Europe and in America herniae, discovered after strains, falls and injuries, have been accepted as "accidents" and their possessors have been, and are being, compensated accordingly by

their employers or by insurance companies, with and without court decisions.

It is time that, in the interest of fairness and of scientific truth, this should be changed. It is time that medical men, familiar with the anatomy and the pathogenesis of herniae, should cease to certify them as accidents and should instruct the courts in the relationship between ruptures and antecedent strains, falls and injuries.

Only such an abdominal hernia should be considered traumatic as develops at the site of a tear or perforation of the abdominal wall produced by an external injury. If any other kind of injury, fall or strain is followed by the discovery of an abdominal hernia that injury or strain merely drew attention to a previously existent but unnoticed hernia or, at most, it *"may have supplied the last of a series of forces which resulted in the development of a hernia in the presence of pre-existing abnormal anatomical conditions."* The same thing might have occurred while the patient was lifting his suit case or when sneezing."

Only, if at all, to the extent that an injury or undue strain operated to effect the descent of a previously undeveloped hernia—and with the burden of proof on the individual—should inguinal, femoral and umbilical herniae be compensated as the consequences of accidents, industrial or otherwise.

As a step in the correction by the profession of its previous attitude, and in the education of the law and the public concerning the relationship of herniae and injuries, let us vigorously discourage the use of that very misleading term, "rupture."—W. M. B.

Letter to the Editor.

TWILIGHT SLEEP.

New York, September 25, 1915.

Editor, AMERICAN JOURNAL OF SURGERY:

The editorial article on "twilight sleep" published in the September number of the AMERICAN JOURNAL OF SURGERY is of such importance and value that it deserves to be read by every member of the medical profession and is also worthy of note and comment by the lay press. Dr. Frank, in well chosen words, lays bare the shortcomings of the twilight sleep procedure in a most admirable manner and the only criticism that may be made is that his language is not really sufficiently strong in condemning the senseless furore which has been engendered by the lay press. It is a matter of

sincere regret that medical men have allowed themselves to be carried away by this hysterical and almost fanatical movement. Even a perusal of the technical articles that have appeared in our American journals, fails to prove convincing and an analysis does not disclose in what manner the patient is actually benefited by the procedure. A condition of amnesia subsequent to the labor seems to be the chief factor that counts in the conclusions formulated by these investigators. It is ridiculous to assume that the condition of the child is any better than after a well managed labor, or that the patient herself shortens her puerperium, or is less shocked than under other circumstances. The unforeseen complications in labor are so many that it seems a matter of good fortune that more accidents have not occurred among the twilight sleep cases. Perhaps they have taken place and failed to be reported—but let us be charitable in our first assumption. Any impartial observer who has witnessed the contortions and other disturbances of a patient in the semi-narcotic condition induced by the combination of scopolamine and morphine, cannot fail to be impressed by the senselessness of, and the danger attending this procedure. Unfortunately a physician who does not agree with the roseate views advanced by the practitioners of the method is at once relegated to the domain of the unprogressive class or even worse. The hysteria has in fact reached such dimensions among expectant mothers that it is difficult to convince a given individual of the unnecessary and even dangerous character of the method. The means of exploitation which have been employed in publishing a knowledge of the twilight sleep procedure are not unusual in this country or in that of its origin. In Germany, one frequently meets similar campaigns in favor of proprietary drugs or appliances, which if carried out in our own country would immediately be branded with the flavor of advertising schemes. Our American medical profession, however, has become so impressed with the "made in Germany" endorsement that its members are entirely too willing to accept whatever of medical novelty, good or bad, originates in that country. An interesting development in regard to this propaganda may be noted in one of our lay magazines in which a distinct bid is made to expectant mothers to employ the twilight sleep procedure. The publication in question is prepared to supply inquirers with the name and address of physicians near their homes who will virtually agree to afford them the benefits of twilight sleep. It would be interesting to know what members of the medical profession have undertaken to resort to this form of personal advertising.

It is a matter worthy of investigation by the Boards of Censors of our County Societies, and it is to be hoped that the matter will be taken up.

GEORGE W. KOSMAK, M.D.

ERRATUM.

The cut No. 7, which appeared in Dr. Tovey's article in the October issue should have appeared in his article which was published in the August Number.

Surgical Suggestions

Patients with purulent peritonitis should be put into Fowler's position *before* as well as *after* operation.

It should not be forgotten that belching and epigastric distress is often a symptom of coronary (cardiac) endarteritis, which is not infrequently thus mistreated for hyperchlorhydria, ulcer, etc., for months or years before other evidences of the cardiac affection become pronounced. When of this origin the distress is most upon exertion, and may also be associated with thoracic (anginoid) pains.

When a wound has a "sloughy" appearance, i.e., a yellow-gray coating, especially if there is more or less prostration and fever, it is worth thinking of the possibility of a "wound diphtheria." Bacteriological examination will determine the question. If there is a reasonable clinical presumption of diphtheria infection treat promptly with antitoxine. Unless vigorously treated wound diphtheria is apt to be fatal.

A suction apparatus is a most desirable addition to the surgeon's armamentarium for the cleanly emptying of a distended gall-bladder and for the quick removal of accumulations in the abdomen of blood (ectopic pregnancy, rupture of the liver, etc.) or pus (purulent peritonitis, pelvic abscess, etc.). It removes these fluids without disseminating them and, since the suction is continued while the operation proceeds, it obviates endless sponging and saves an amount of time that, in some of these cases, may be the margin between recovery and death.

GASOLINE AND IODINE DISINFECTION.

. . . In lacerated, abraded or punctured wounds, not requiring suture, I wash off with gasoline, swab out thoroughly with iodine and alcohol, being careful to go to the bottom of the wound. This can be done anywhere, any time and under any surroundings, be they ever so unsanitary.—J. W. ALSEBROOK, in the *Southern Medical Journal*.

Surgical Sociology

Ira S. Wile, M. D., Department Editor.

ALCOHOLISM AND INDUSTRIAL ACCIDENTS.

The interest that is being taken in the decrease of degenerative diseases through limitation of the use of alcohol naturally suggests the relation of intoxication to industrial accidents. The statistical studies of E. B. Phelps on The Mortality of Alcohol indicated that alcohol may have been an important contributory factor and sometimes the principal causative factor in the mortality for the year 1908 between the ages of 20 and 74 years for the following accidents.

Heat and sunstroke	43	per cent.
Cold and freezing	17	" "
Inhalation of poisonous gases	17	" "
Accidental gunshot wounds	10	" "
Injuries by machinery	7	" "
Injuries in mines and quarries	8	" "
Railroad accidents and injuries	7	" "
Street car accidents	8	" "
Injuries by vehicles and horses	8	" "
Automobile accidents	10	" "
Other accidental injuries	10	" "

Further, alcohol may have been a harmful contributory factor in the mortality of fractures and dislocations to the extent of 8 per cent. and burns and scalds 4 per cent.

Based upon the mortality figures of 1908, it was estimated that 5.1 per cent. of the total mortality from all causes at all ages was directly or indirectly influenced by alcohol, while 7.7 per cent. of the mortality may have been influenced by the same factor for deaths at the age of 20 years and upwards.

Possibly, the general relation of alcohol to accidents may be better studied from a consideration of the official figures dealing with industrial accidents. For example, among 6,813 claims disposed of by the New York State Workers' Compensation Commission intoxication was found in only 5 or 10 cases.

In Massachusetts, during 1912 and 1913, 84,000 non-fatal accidents occurred. Of 274 fatal accidents insured, in only four instances was there any charge of intoxication.

In Wisconsin, among the contested cases from September, 1911 to June 30, 1913, intoxication was charged as a cause of injury in only one case out of 62.

The Industrial Commission of Missouri claims that the fault on the part of workmen due to care-

lessness, disregard of instructions, drunkenness, etc., was responsible for 22.7 per cent. of the accidents. There is no specific proportion ascribed to alcohol.

The New Jersey Compensation Law enacted in 1911 defines negligence of employee as consisting of "(1) deliberate act or failure to act, or (2) such conduct as evidences reckless indifference to safety, or (3) intoxication as the proximate cause of injury." According to a statement by Gustavus Myers in the September number of the quarterly publication of the American Statistical Association, "Wilful negligence whether in the form of intoxication or in ways described in the Act (The New Jersey Act) was so nearly absent as a factor as to be dismissed from consideration."

In the 1914 report of the Industrial Accident Board of Massachusetts, it is noted that "So far as wilful negligence (including intoxication) may enter into the matter of personal fault, there is, judging from the returns, hardly any of it admixed with the causes of industrial accidents in Massachusetts. Of 156 cases contested by appeal to the arbitration committees or to the Courts, from July 12, 1912, to June 30, 1913, there were only four cases in which there was any charge of intoxication, and in only two cases were claims denied on that ground."

"The Wisconsin law penalizes intoxication 15 per cent. This provision was inserted on the supposition that drunkenness was a frequent cause of accident. The records of the Industrial Commission show, however, that in only 4 or 5 cases out of the 18,139 cases up to January 1, 1915, has the employer made any claim that the employee was intoxicated, and in only one case has the Commission found that the injury was caused by intoxication." This makes it obvious that the question of intoxication does not merit very serious consideration as a prominent direct cause of industrial accidents in Wisconsin.

Of 291 fatal accidents in the State of California during the first six months of 1914, only one is attributed to intoxication.

In the 1912 report of the Industrial Insurance Department of the State of Washington under the sub-head "Intoxication" it is reported: "Framers of compensation acts in other states and of the Federal bills for railway employees engaged in interstate commerce have devoted considerable attention to intoxication as productive of work accidents. The records of the Commission do not show many cases of intoxication. In one instance, a section worker, while in an intoxicated condition, had evidently laid down on the track of a logging rail-

road, and lost an arm from being run over by an engine. In instances of reported intoxication the workman has denied it, although admitting having had a glass of beer or two or the like. The question is invariably raised 'what degree of intoxication should be necessary to either bar a claim or result in some penalizing reduction?'"

In the Federal report dealing with the cases of the United States Workmen's Compensation Act of 1908, it is stated that, of 406 contested cases in four years, negligence or misconduct was alleged in 80 cases, and in only one case was intoxication charged and this failed of substantiation in the courts.

From this brief resumé of the figures from a few States in the Union, it is patent that in so far as industrial accidents themselves are concerned, alcoholism or at least acute alcoholism is responsible for but a small proportion of fatal or non-fatal industrial accidents.

It may possibly be true that the chronic alcoholic is a bad subject for injury and as a result severe injuries may more reasonably be expected to result fatally. The degenerative effects of alcohol may profoundly influence the resistance of the employee and render him particularly susceptible to industrial diseases. Industry itself has recognized the patent hazard from accidents to drinking workmen, and thus has formulated strict rules for the elimination of all known alcoholics from industrial employment.

The discrepancy between the mortality figures presented by Phelps, attributing 7.7 per cent. of the mortality at the age of 20 or above to the direct and indirect influence of alcohol, and the figures evidenced by the reports of the industrial accident commissions indicates that industry is discriminating against the drinkers with more than average success. The small number of industrial accidents due to intoxication speaks well for the general standard demanded of employees by large industrial employers. The responsibility for the safety and welfare of the public, as well as for the protection of the employees, should make it essential that no man known to be a frequent or free imbibor of intoxicants should be employed in a position of trust, responsibility, or hazard.

RADIUM IN PRURITUS.

The application of radium has a marked analgesic action, and this is well seen in the treatment of certain persistent cases of pruritus. Short exposures of strong plaques will relieve the itching after all other methods have failed.—W. H. B. ATKENS, in *The Canadian Practitioner*.

Book Reviews

Fractures and Dislocations. Diagnosis and Treatment. By MILLER E. PRESTON, A.B., M.D., Instructor of Anatomy, University of Denver; Visiting Gynecologist, City and County Hospital, Denver, Colo. With a chapter on *Roentgenology* by H. G. STOVER, M.D., Professor of Roentgenology, University of Colorado, etc. Large octavo; 813 pages; 800 illustrations. St. Louis: C. V. Mosby Co., 1915. \$6.50.

This volume is essentially a practical, yet a thorough treatise on its subject. The chapters on dislocations are not isolated as is usually done, but are found adjoining the chapters on the fractures of those bones comprising the various joints. Thus fractures of the ends of the bones, fracture-dislocations and simple dislocations are considered together. The most noteworthy of the numerous illustrations are those taken after the injury, showing how much of diagnostic value may be learned from inspection alone.

A chapter on the pathology of fractures, and of their healing, on the causes of delayed union and its treatment, would have been desirable. A chapter on general principles of treatment and after-care, and on apparatus, would have economized space and concentrated this subject. Too little attention is paid to the uses of plaster of Paris, the author apparently fearing casts and preferring splints. The details of applying extension apparatus in its various forms are not dealt with sufficiently. No mention is made of the Volkmann sliding frame, nor of the Steinmann nail extension method of securing traction.

The adequate paragraphs in surgical anatomy are helpful in the understanding of displacements, symptoms, etc. The anomalies of the carpus, illustrated by Roentgenograms, form an interesting paragraph. The chapter on the use of the x-ray supplies a proper understanding of its place in diagnosis and treatment. The chapters on injuries to bones of the face and the skull, to the scalp and the brain, are especially thorough. The differential diagnosis of fractured skull is carefully discussed. The description of the application and technic of open operations, and of bone transplantations, is a valuable addition. The Albee technic is included.

The book gives the impression of being a happy medium between the classical work of Stimson and the shorter practical volume of Scudder. It will find a useful place in the library of both the student and the practitioner. It is attractively printed and the many original illustrations are very helpful.

Fractures. By JEAN TANTON, Medecin-Major de l'Armée, Professor agrégé du Val-de-Grâce. 860 pages; 470 illustrations. Paris: J. B. BAILLIÈRE ET FILS, 1915.

The first 321 pages deal with the general subject of fractures. The author makes it evident how much new help radiography brought to the study of fractures; however, he warns against the possible errors from x-ray interpretations, viz: some fractures are invisible on the x-ray plate; at times a defect becomes exaggerated on the plate; not infrequently early callus formation is missed, since calcification begins only on the 16th to 20th days after fracture.

The mechanism of fractures is presented clearly, the text being free from confusing details and diagrams. The classification is simple and adhered to throughout the book. Each type of fracture is discussed separately; the physical signs are grouped into subjective and objective signs; the pathology is divided into three periods, first, a period of inflammation; second, a period of absorption, when the acute inflammation subsides; third, a period of repairs. Treatment is given at some length, also its indications and its technic. The sequelæ are emphasized, particularly thrombosis and embolism and fat embolism; the symptomatology, diagnosis and treatment of these conditions are very well written. The chapter on pseudarthrosis deserves special mention for its lucid and orderly descriptions.

The rest of the book—pages 321 to 800—takes up the fractures of the upper extremity; each part of the limb is considered separately.

This book is a valuable addition to the library of the surgeon of fractures.

A Manual of Surgery. For Students and Physicians. By FRANCIS T. STEWART, M.D., Professor of Clinical Surgery, Jefferson Medical College; Surgeon to the Germantown Hospital; Out-Patient Surgeon to the Pennsylvania Hospital. Fourth edition. Octavo; 774 pages; 580 illustrations. Philadelphia: P. BLAKISTON'S SONS & Co., 1915.

This volume was prepared for the undergraduate, the author states in his first preface. The book, therefore, attempts to present the general field of surgery succinctly. This it succeeds in doing, in the main; unessentials are avoided. Etiology, pathology and symptomatology are mentioned briefly, yet adequately, on the whole; operative treatment and technic are comparatively expanded. The articles on blood surgery are brought up to date with Carrel's work; lung surgery is also given in the light of recent work, particularly the anesthesia methods of Meltzer-Auer and Elsberg. The article on the stomach is good; it shows the best illustrations of the book (Mayo's illustrations were used); the pages on the transplantation of fat, fascia, bone and veins are compact in subject matter. In fact, numerous plastic procedures are described throughout the book. The accompanying diagrams and illustrations are clear and helpful.

The article on hernia is unsatisfactory. In the radical treatment of inguinal hernia Stewart devotes most of the space to a description of his own method. For umbilical hernia only Mayo's operation is described; Blake's is not mentioned. The illustrations are not good; one or two are quite poor, viz: Fig. 442 and Fig. 443.

Of special interest to surgeons are the descriptions of the author's operation of removal of the breast and his operation of subtotal gastrectomy.

A Practical Handbook of Surgical After-Treatment. By ALAN H. TODD, B.Sc., M.S., London; F.R.C.S., England; Surgical Registrar and Tutor, Guy's Hospital. Crown octavo; 256 pages; 24 illustrations. New York: LONGMANS, GREEN & Co.

After-treatment plays a vital rôle in most surgical procedures of today. For instance, plastic operations are wasted unless the after-treatment is proper; the whole of orthopedic surgery, practically, depends for its success upon good after-treatment. And in no small measure it can be maintained that almost every operation may be successful, or otherwise, according as the post-operative treatment is good or bad. This idea is well amplified by Todd's volume, which is filled with many working "tips." How to treat a burn; how to feed a gastroenterostomy patient; how to combat surgical and medical shock and pain; the correct treatment of wounds; the immediate and remote indications of hemorrhage—these are but few of the practical subjects mentioned. The book is really a compendium of surgical suggestions tried in the author's experience and found not wanting.

Surgery of the Blood Vessels. By J. SHELTON HORSLEY, M.D., F.A.C.S., Surgeon-in-charge, St. Elizabeth's Hospital, Richmond, Va., etc. Octavo; 304 pages; 89 illustrations. St. Louis: C. V. Mosby Co., 1915. \$4.00.

Horsley occupies an enviable place among those American surgeons who have made noteworthy contributions to the most recent developments of blood vessel surgery—a sphere of surgical activity in which other Americans—Murphy, Matas, Halsted, Crile, Carrel and Guthrie—had already done great work.

In this monograph Horsley reviews the development of blood vessel surgery, and describes the operative management of various blood vessel affections—hemorrhage, thrombosis and embolism, aneurism, blood vessel tumors, varices, varicocele, varicose veins, hemorrhoids.

He describes very precisely the various methods devised for vascular anastomosis, including his own in-

genious technic of end-to-end suture, based on that of Carrel, and his technic of lateral anastomosis.

There is an interesting chapter on transfusion which is now chiefly of historical interest, since it was written before the introduction of the "citrate" method and the single syringe methods which, like the more complicated Lindeman procedure, take transfusion out of the field of blood vessel surgery.

In the chapter on thrombosis and embolism Horsley describes Trendelenburg's operation for embolism of the pulmonary artery; but we failed to find any reference to Murphy's procedure (published a few years ago) in a case of embolism at the iliac bifurcation. Indeed, the absence of a bibliography is a serious fault in a monograph such as this. The index, too, is not as complete as it should have been.

Horsley's technic of intestinal resection is described in detail. It is dragged into the monograph with the lame excuse that bowel resection is indicated in mesenteric thrombosis. It would have been quite as appropriate to include the various types of amputation of the extremities for gangrene, the surgery of intracranial and intraperitoneal hemorrhages, etc. Rather more appropriately the author might have included the management of hematomata.

In the final chapter (XVI) Horsley describes his operation of transplantation of the anterior temporal artery in flap plastics for defect of the cheek—an operation which, as he acknowledges, he had elaborated in ignorance of the fact that essentially the same procedure was described by Monks, of Boston, in 1898.

The book is very well illustrated by Miss Helen Lorraine, a pupil of Brödel. As a clear description of the technic of blood vessel suture, of the surgery of arteriovenous aneurism, of endoaneurismorrhaphy, and of certain other blood vessel operations, and as an historical review (minus an adequate bibliography), we warmly commend this small monograph.

Cystoscopy and Urethroscopy for General Practitioners. By BRANSFORD LEWIS, B.S., M.D., F.A.C.S., Professor of Genito-Urinary Surgery, St. Louis University, and ERNEST G. MARK, A.B., M.D., F.A.C.S., Professor of Genito-Urinary and Venereal Diseases, University Medical College, Kansas City. With a chapter by WILLIAM F. BRAASCH, M.D., attending physician, Mayo Clinic. Octavo; 238 pages; 113 illustrations (23 in colors). Philadelphia: P. BLAKISTON'S SON & Co., 1915. \$4.50.

The important contributions of one of these authors (Lewis) in the development of the modern cystoscope are generally familiar, and his competence to prepare such a text-book as this need not be dilated upon.

In this work the authors have furnished a complete guide to the technic of cystoscopy and urethroscopy and an adequate textual and pictorial description of the various findings. It is a book that may be safely and satisfactorily followed by the novice and, indeed, by the more experienced cystoscopist. Most of the standard instruments—cystoscopic and urethroscopic—are described, and their employment in operative as well as in diagnostic work. There is a chapter on pyelography by Braasch, whose monograph on this subject was recently considered editorially in the JOURNAL.

The book is authoritative, complete and entirely practical.

A Text Book of Surgery for Students and Practitioners. By GEORGE EMERSON BREWER, A.M., M.D., Professor of Surgery, College of Physicians and Surgeons, New York; Surgical Director, Presbyterian Hospital; Consulting Surgeon, Roosevelt Hospital, etc. Assisted by ADRIAN V. S. LAMBERT, M.D., Associate Professor of Surgery, Columbia University; Attending Surgeon, Presbyterian Hospital; and by members of the surgical teaching staff of Columbia University. Third edition thoroughly revised and rewritten. Octavo; 1027 pages; 500 engravings and 23 plates in colors and monochrome. Philadelphia and New York: LEA & FEBIGER, 1915. Cloth, \$5.50, net.

This third edition of Brewer's text-book is a considerable improvement on the second and a vast improvement on the first. It is less a new edition than a new book, both in text and in authorship. In the latter Brewer has now associated with him, of the surgical teaching staff of Columbia University, Lambert, Auchincloss, Burnap, Clarke, Corscaden, Darrach, McCreery, Matthews, Peck, Pool, Russell, Sloane, St. John, Whipple and Armitage Whitman. These men have freely revised, rewritten and added to the edition of 1909, Brewer contenting himself with the revision of a limited number of sections.

In spite of its multiple authorship, the work has been kept within the limits of a small octavo of 1,000 pages. We do not say this in praise. Even as a text-book it is too condensed to be adequate to the student's needs.

Modern Aspects of the Circulation in Health and Disease. By CARL J. WIGGERS, M.D., Assistant Professor of Physiology in Cornell University Medical School, New York City. Octavo; 376 pages; 104 engravings. Philadelphia and New York: LEA AND FEBIGER, 1915.

We hold that no one, be he an internist, surgeon or specialist, can exercise his art to the utmost without a knowledge of the modern advances in cardiac pathology and physiology. To those unacquainted with this knowledge, the excuse may be offered that the progress has been so rapid that even those whose business is directly concerned with the subject can hardly keep pace with its manifold phases. That is why a book of this sort, which aims to give a critical outline of the present status of this absorbing subject, seems highly appropriate. The author, whose work among cardiologists is recognized for its versatility and soundness, has done his task well. He has hit upon a happy combination of text-book and work of reference, so that it will appeal not only to the average medical reader, but also to the cardiac specialist. The discussion is carefully phrased, and in debatable topics the various views are judiciously balanced.

The text, however, reveals a surprising omission. There is no discussion whatever of cardiac therapy, a subject that has undergone almost as profound a change in recent years as cardiac physiology. The author may have had good reasons for omitting this subject, but we cannot see them in view of the fact that so much of the text is concerned with clinical data. This omission, therefore, renders the book of less value than it would have been. With this exception, the work can be cordially commended.

Human Motives. By JAMES JACKSON PUTNAM, M.D., Professor Emeritus, Diseases of the Nervous System, Harvard University. Duodecimo; 179 pages. Boston: LITTLE, BROWN & Co., 1915.

The purpose of this book can be briefly defined as an interpretation of human conduct based largely upon the psycho-analytic method. Broadly speaking, it is an attempt to rear a philosophic system, in which this interpretation is the underlying basis. We need hardly remind those familiar with Dr. Putnam's writings that his discussion is broadly conceived, profoundly analytical and full of suggestiveness. Dr. Putnam writes not only like a psychologist and a metaphysician, but like a man of wide culture and sympathy. Moreover, his style has a truly literary touch; indeed, the text is full of quotable sentences. We have read in recent years nothing more uplifting and stimulating than his final chapter on "An Attempt at Synthesis." The book deserves a wide reading, not only for its literary charm, but also because it is one of the few attempts to approach philosophic problems by way of medicine.

Principles of Human Physiology. By ERNEST H. STARLING, M.D. (Lond.), F.R.C.P., F.R.S., Hon. M.D. (Breslau), Hon. Sc.D. (Cambridge and Dublin), Jodrell, Professor of Physiology in University College, London. Second Edition. Octavo; 1271 pages; 566 illustrations, 10 in color. Philadelphia and New York: LEA AND FEBIGER, 1915.

In this, the Second Edition, the author has rewritten many of the sections dealing with voluntary muscle and

the circulation. Many modifications have also been made in other parts of the work. New sections have been added on the nutrition of the brain and the innervation of the bronchi.

It is hardly necessary to make any additional comment upon this work, except to add our appreciation to the host of encomiums with which this work has been received. Although in existence only a few years, Starling's Physiology has already been established in the select class of standard text-books of medicine.

Mechano-Therapeutics in General Practice. By G. DE SWIETECHOWSKI, M.D., M.R.C.S., Fellow of the Royal Society of Medicine, Clinical Assistant, Electrical and Massage Department, King's College Hospital. Crown octavo; 141 pages; 31 illustrations. New York: PAUL B. HOEBER, 1914. \$1.50, net.

The author lays stress on the value of mechano-therapy, a therapeutic aid all too frequently forgotten or employed with only indifferent skill, and, therefore, with indifferent results. Massage can bring good results, he points out, in surgical conditions as well as in constitutional disorders. There are few contraindications to its use. These are, mainly, acute inflammations and chronic granulomata.

The book divides itself into three parts, dealing respectively with the indications and technic of massage in surgical conditions; (2) medical conditions, and (3) special conditions, i. e., gynecology, otology, laryngology, dermatology and dentistry. The chapters on fractures (pages 5 to 41) are well written and contain helpful suggestions. The exercises described for deformities are simple, clearly described and convincing.

Progress in Surgery

A Résumé of Recent Literature.

Intestinal Adhesions; Bowel Protection. M. B. BRINSMADE, Brooklyn. *Journal of the American Medical Association*, September 11, 1915.

Brinsmade says that it is an accepted fact that adhesions may follow any abdominal operation. Modern operative technic is able to exclude bacterial invasion and minimize trauma to the intestines. The element of danger to be excluded is irritation to the peritoneal coats and he also calls attention to the prevention of injury of adjacent normal organs. Intestinal adhesions may not cause serious symptoms, and we may say that they are therefore not of themselves necessarily productive of harm while acknowledging that very slight adhesions may cause invalidism and danger. Certain persons seem more liable to them than others. He was, therefore, led to consider the methods of prevention and the question of protection to the intestines not in immediate contact with the site of the operation. It is interesting, he says, to note the diversity of methods of various operators and he mentions his experience in Germany where they seem to use no moist pads or gauze and make very free use of the dry material. Brinsmade has been convinced for a long time that gauze pads left in contact with omentum or peritoneum for any period of time might lead to adhesions, and he relates cases illustrative of this that were observed by him. With these cases in mind, he had discontinued the use of laparotomy sponges as much as possible, never placing them in actual contact with the bowel. One or two large sheets of gum rubber are used next to the intestine, isolating it from the gauze. The rubber slips out of place and is a nuisance to the surgeon, but the protection it affords overbalances its disadvantages. He also relates experiments on dogs performed by himself and by the Department of Surgery of the New York University at his request. It seems fair to conclude from these experiments that sheets of gum rubber did less harm than gauze pads and that if the human intestine is similar to that of the dog it will do less damage to it. To operate in all cases of intestinal adhesions would lead to many disappointments, but there is a type in which it is imperative,

when adhesions occur after appendectomy. His greatest success has been with adhesions in the upper abdomen. In conclusion, Brinsmade says that dry sponges do more harm than moist ones and a rubber dam does less harm than moist sponges and the least damage of all is done to the intestines if packing can be dispensed with altogether. The article is illustrated.

Transverse Incision in Operations for Appendicitis.

A. E. ROCKEY, Portland. *Journal of the American Medical Association*, September 11, 1915.

It is not quite as easily understood as the right rectus incision, and for that reason he gives a word or two in regard to the anatomy. In the region of McBurney's point the fibers of the internal oblique and the transversalis run directly transverse and the external oblique is only an aponeurosis. The aponeuroses of these muscles are united at their insertion at the border of the sheath of the rectus, the fibers of the broad tendon becoming a part of the sheath. This junction is the key to the situation. The skin incision is made directly transverse with its center on McBurney's point though it may be lower if conditions require. In ordinary cases the incision should be two or two and a half inches in length and may be longer as required. It passes through the outer part of the sheath of the rectus, severing the tendinous border and the aponeuroses of the muscles transversely. Then the handle of the scalpel may be inserted below and the finger above and the wound spread wide open. Not a muscle fiber is cut. "The fibers of the internal oblique and transversalis separate in a transverse direction. The aponeurosis of the external oblique is broader than that of the other muscles, thus permitting the incision through this to be carried further to the outer side. When the muscular part is reached, the spreading pull separates the fibers obliquely upward. The muscle is, however, as elastic as rubber, and the retractor, which is at once inserted, drawing outward, readily brings it into the transverse line. The rectus is now drawn back into its sheath at the inner side by another retractor. The peritoneum is divided on the transverse line. The splendid exposure which this incision gives and the ease with which it is made will surprise the surgeon who tries it for the first time." Definite preoperative diagnosis is important as the operation is not suitable to pelvic operations. If there is any doubt as to the diagnosis between the appendix, tubes or gallbladder the vertical incision is preferable, though in emergency the transverse incision may be prolonged to permit general abdominal exploration. In interval cases of appendicitis the results are ideal both in ease of operation and a minimal scar. Instead of having to push the small intestine out of the way and using gauze pads, it is out of sight and not exposed to handling. When the appendix is in the iliac fossa the finger readily separates its adhesions and in any other situation the cecum, which presents first, is the direct guide. Postoperative ileus is minimized. The drainage is short and direct. When drainage is wanted the patient is placed on the right side with the knees drawn up and the shoulders and head slightly elevated. This brings the drain to the lowest point and elevates the diaphragm above the line of sepsis. In clean cases a single suture passed deeply through the aponeurosis at the border of the rectus will close the entire wound.

Primary Malignant Adenoma of the Liver Simulating Tropical Abscess. D. G. MARSHALL, Edinburgh. *Edinburgh Medical Journal*, July, 1915.

Marshall describes an interesting case of disease of the liver in a man 34 years of age who had just returned to England from the Tropics. Right sided pain, slight evening temperatures and progressive enlargement of the liver led to a diagnosis of Tropical abscess. Closer observation however revealed absence of parasites in the stools and a normal leukocyte picture. The diagnosis of new growth was therefore made, and verified at operation.

The author points out that in doubtful cases it is advisable to bear in mind that patients from the Tropics, presenting signs of affection of the liver, may be suffering from diseases not necessarily limited to the Tropics.

A Single Stitch Appendectomy. W. F. FOWLER, Rochester. *Medical Record*, September 25, 1915.

1. Two clamps are applied, one to the base of the appendix and to the mesoappendix about 3/10 cm. from the cecum; the other parallel to and close above the first. Small curved broad ligament clamps may be used, but the special instrument is more convenient. Close the instrument tight in order to hold the mesoappendix securely.

2. The mesoappendix and appendix are severed between the clamps close to the lower one, preferably with a scalpel, and the appendix stump is touched with carbolic and alcohol.

3. A straight round intestinal needle, conveniently 4 5/10 to 5 cm. long threaded with a number two catgut, or permanent material if desired, is passed through the mesoappendix beneath the clamp and close to the appendix. The appendix is tied off and both ends of the ligature cut short.

4. Stitches with the same needle and suture are passed through the mesoappendix and around the clamp from the outer border to the appendix. Three or four turns about the clamp are usually sufficient. These stitches are taken after the manner of securing the broad ligament in salpingectomy.

5. Downward pressure is made on the clamp which depresses the appendix stump and allows the cecum to fall together over it. The appendix stump is permanently buried by suturing the approximated bowel surfaces with a few Lembert stitches, using the same needle and suture as in step four.

6. Traction is maintained upon the bowel end of the suture while the clamp is withdrawn through the loops on the mesoappendix.

7. The first or mesoappendix end of the suture is drawn tight and is tied securely to the bowel end.

With a single stitch and one knot (exclusive of the tie on the appendix) we have buried the appendix stump as with a purse string, secured the mesoappendix and tied it down to the cecum over the appendix site.

The Value of Some Tests of Renal Permeability.

ROBERT H. GREENE, New York, *New York Medical Journal*, August 14, 1915.

Greene has employed the various methods during the past few years and has arrived at the following conclusions:

First, it can be stated that if one kidney is diseased and the other sound, through ureteral catheterization phloridzin will demonstrate which of the two kidneys is in the best condition. Second, it is the most practical test for the general practitioner, without ureteral catheterization, at present at his command, being more accurate in its findings than the phthalein test and less complicated than the nitrogen test. Third, the delay of appearance of sugar in the urine following its administration will almost invariably indicate either a diseased condition of the kidney, or less frequently some abnormal condition of the system. Fourth, delayed appearance of sugar following the use of phloridzin, furnishes a marked indication of some diseased systemic condition and is a strong indication for farther investigation.

Intra-urethral Operations for Pathologic Conditions in the Prostatic Urethra and at the Bladder Neck.

G. MACGOWAN, Los Angeles, *Journal American Medical Association*, September 18, 1915.

First taking up papillomatous growths, he says they undoubtedly originate from slight injuries as similar growths do externally, but from their situation and with favoring effects of heat, moisture and chronic infection they present a very different appearance from external parts. He divides them into two classes: first, the soft or mucoid with gelatinous consistence and, structurally, with but one layer of flat epithelium and one central blood vessel. They are easy to destroy by a light touch of a glowing electric point or a flash from a high-frequency wire, or even by topical applications of solid silver nitrate or other like agents, unless they are situated directly on the bladder neck, where they are liable to produce unpleasant hemorrhage if disturbed and not completely destroyed; second, fibroid

polyps in which the central blood vessel may be single or branched. They are surrounded by appreciable stroma and present, externally at least, two layers of flat epithelium. This type is not so translucent as the other and not so easy to destroy unless one is lucky enough to sever the base by the cautery knife or coagulate the central blood vessel by the spark at the first trial. This is more apt to be found attached to the lateral walls posterior to the colliculus and to grow toward the bladder or to be attached to the lateral or upper surface of the bladder neck within the grasp of the sphincter or just outside of it. True papillomas or warty growths are not so common, and MacGowan finds them more frequently in front of the colliculus and in the grasp of the external sphincter. They are generally difficult to cure, often requiring many cauterizations at intervals of from two to three weeks before they disappear. Adenoid and cystic growths are frequent; the latter are easily destroyed by the cautery. Adenomas are more rare and MacGowan does not believe either of these types to be the directors of the infective processes. If a man of middle age or past presents these symptoms it is not necessary to assume that he is necessarily suffering from an enlarged prostate which has to be removed. He may need nothing more for his relief than having the growth removed through the urethra. A typical case of this kind is reported. From time to time one sees men who have had complete prostatectomies performed who, after a prolonged peace, have again symptoms of frequent and difficult urination and partial retention, and when we use the irrigating urethroscope we find the enucleated cavity from the removal of the prostate partially or wholly filled with these fungous new growths. Three cases of this sort are reported, relieved by removal of such growths. In operating on cancerous and chronic inflammatory conditions of the prostate it is often impossible to obtain a smooth channel through the posterior urethra on account of obstructing protuberances or growths which cannot be gotten rid of by the rongeur, curet or scissors. The combination of the irrigating cystoscope and urethroscope for accurately locating them and the electric cautery or the high-frequency bipolar spark in these cases is particularly valuable, as it furnishes a means of relief or apparent cure otherwise impossible. Illustrative cases are given. All these operations can be done under local anesthesia with stovain or alpin nitrate solution, and when this is not sufficient, intradural anesthesia with tropococain is the method of choice.

Prostatectomy Mistakes and Failures. G. S. WHITE-SIDE, Portland, Ore. *Journal of the American Medical Association*, October 2, 1915.

Mistakes in the management of prostatic cases are here emphasized. In 1905 he read a paper publishing the fact that many surgeons had an average mortality of 20 per cent. in prostatectomy, and only about 30 per cent. of good results. The paper was productive of good since Young, in 1906, produced a splendid critical analysis of these cases to prove that when properly performed the mortality of the operation is low and the result good. In the present paper about half the surgeons contributing information, operating on about half (820) of the 1,423 cases, are men of unquestioned training and their mortality is less than 3 per cent., while in the hands of surgeons of less experience in prostatectomy it is 26 per cent. He does not speak of novices, but of men undoubtedly good surgeons otherwise, but not sufficiently experienced in this particular operation. There are four excellent general surgeons contributing each a few cases to the series who prove the exception to the rule. With regard to diagnosis there are many things that are important but are neglected. Taking only the case reported in which the surgeons have evidently tried to differentiate between hypertrophy and cancer, 7.3 per cent. of the patients were found to have cancer. This is a considerable proportion and is worth considering before operating. With regard to the high relative merits of the high and low operations there is so much of the personal equation in this that he does not hope for any general agreement. It is only fair to say that a rough tearing-away operation by the perineal route through a small incision without much regard to the anatomy causes many untoward results which are probably

avoidable. In determining the probable chance of the patient before operation, perhaps the one most important thing is to ascertain the functional activity of the kidneys, and failure to do so accounts for much of the high mortality that has occurred. Rare judgment is needed, guided by experience, to decide whether to operate immediately or delay while medical treatment is employed to improve the general conditions, or whether preliminary drainage operation is indicated. Choice of an anesthetic is important, and Whiteside thinks that spinal anesthesia is possibly the safest—certainly in the presence of chronic nephritis. The existence of vesical diverticula is rarely suspected unless cystoscopically discovered and is liable to give bad postoperative results. Diabetes is a not infrequent complication, and unfortunately urinary retention, hemorrhage, or pain frequently forces the surgeon to take the increased risk of operating to save life in spite of probable unsatisfactory results. Squier believes the average duration of life after the habitual use of a catheter is begun to be less than three years. If this is so, prostatectomy undoubtedly offers an added period of comfort to the patient in his advanced age. Some testimonies of surgeons regarding mistakes made or subsequent histories of patients are quoted. It is generally a mistake, Whiteside says, to be in a hurry before, during or after an operation. Insufficient preliminary care, inexact diagnosis, and hasty judgment are equaled as mistakes only by too great haste during operation and lack of skilful care afterwards. Dealing as we have to do with unsound old men, a successful prostatectomy must have every factor in its favor. A surgeon should have experience and carefully study his patients and personally supervise the aftercare.

Epididymotomy, a New Operation. E. J. MERRITT, Atlanta. *Journal of the American Medical Association*, September 11, 1915.

"The site is prepared as for any surgical operation on the scrotum. The scrotum is grasped on the affected side, as much gentleness being used as is consistent with firmness. Three per cent. iodine is applied to the field. A 1 per cent. solution of cocaine is injected at the lower part of the scrotum, anesthetizing the skin from one-half to one inch in length. Then the needle is pushed straight down, and a few drops distributed in the globus minor. With a sharp-pointed bistoury, an incision is made along the anesthetized line in the scrotum, and then with care the point of the knife is advanced into the globus minor, and several stabs or punctures are made. A blunt-pointed probe is then pushed along the tracks of the knife and blind avenues opened up. The wound is then packed with 5 per cent. iodoform gauze. No sutures are required. A plain gauze dressing is applied, and the scrotum kept well supported." This operation secures free drainage at the most dependent point, relieves tension, pain and discomfort, can be performed under local anesthesia at the office, greatly shortens the duration of the disease and is devoid of risk. The incision is much smaller than in other operations of epididymotomy. The technic is simple and any one with most casual surgical experience can perform it.

Treatment of Acute Epididymitis by Aspiratory Puncture. H. W. E. WALTHER. New Orleans: *Medical Record*, October 2, 1915.

A very sharp, fairly large needle attached to a 10 cc. syringe is thrust into the inflamed epididymis, and an attempt is made to aspirate the contents. Usually two or three punctures are made at different points. Ethyl chloride freezing is used as an anesthetic; in very sensitive patients, novocaine may be employed. Although painful, the relief of pain is almost immediate, and within six to twelve hours the swelling and fever are diminished considerably. It is not essential to confine the patient to bed.

The Treatment of Fibroids of the Uterus by the x-Ray. GEORGE E. PFAHLER, Philadelphia. *New York State Journal of Medicine*, September, 1915.

The indications for the treatment of hemorrhages due to mynomas are given as: (1) All cases of myoma in

elder women in whom there is already a well-advanced anemia, which may be the cause of an anemic heart. (2) All elderly and young women with myomas, in whom there is marked organic heart disease, diabetes, chronic nephritis, marked lung disease and goiter with cardiac manifestations. (3) All patients beyond the age of 40, in whom there is no contra-indication to the treatment. The intramural or interstitial variety gives the best results.

Contraindications are: (1) All cases of myoma in which the tumor is pedunculated or which can be excised without destroying the reproductive powers of the patient. (2) Fibroids that are believed to have undergone malignant degeneration, or that have become gangrenous or infected. (3) Fibroids associated with diseased adnexa. (4) Fibromas which are producing such marked symptoms that the patient is endangered more by waiting two or three months for results of Roentgen therapy, than by the results of an operation.

Roentgen therapy must be looked upon as a very efficient adjunct to the gynecologist's armamentarium, and while the rays should be applied by the roentgenologist, he should work hand in hand with the gynecologist.

Deep Roentgen therapy stops the hemorrhage associated with uterine fibroids. This is followed by a gradual disappearance of the tumor. The atrophic process may extend over a number of years and continues long after the cessation of the treatment.

The treatment of metropathic hemorrhage is almost uniformly successful.

Uterine hemorrhage when occurring at the menopause, when not malignant, will usually respond very quickly. There should be an increase in weight and an improvement in the blood condition, and when this does not occur suspicion of malignancy should be aroused.

Some good results can be obtained in inoperable carcinoma. The deep Roentgen therapy should be especially recommended as a post-operative procedure in all cases.

Tuberculosis of the Uterine Appendages. H. C. TAYLOR, New York. *Journal American Medical Association*, September 11, 1915.

Taylor says that anything that predisposes to tuberculosis in general is a predisposing cause also of genital tuberculosis. Gonorrhea is claimed as a predisposing cause of tuberculous salpingitis, and this is possible. A moderate infection from adjoining organs would be more frequently followed by a tuberculous process than the extensive infection leading to occlusion of the tubes. A tuberculous infection of a hydrosalpinx has been reported. Congenital deformities and malformation of the appendages predispose to the tuberculous infection and the puerperal uterus is more likely to become infected than the normal one, therefore pregnancies would indirectly predispose to tubal tuberculosis. The frequency with which this occurs will be found greater the more carefully examination is made. While statistics differ it is probable that at least 10 per cent. of all inflammatory diseases of the uterine appendages are of tuberculous origin. Tuberculosis of the ovary without involvement of the tube is very rare, and the extension of the process from the tube to the uterus is common. There are three modes of infection: (1) through the blood and lymphatic system; (2) from neighboring organs; (3) by ascending affections through the vagina. This has been questioned and it is doubtful whether it is of frequent occurrence. Tubal tuberculosis is ordinarily a secondary infection. In nearly every case there is elsewhere in the body one or more tuberculous foci. The condition is systemic. The treatment depends on the effects produced on the general process, the health or life of the patient, and on the extension of the infection. Tuberculous salpingitis, like other forms, is rarely the direct cause of death. The destruction of the tubes and ovaries does not in itself materially affect the general health. It is difficult to estimate the danger of its extension, and it is disputed how often it may produce a general peritoneal infection. The weight of evidence is against such extension, and practically there is no absolute rule regarding operation to prevent such a local or general trouble. As regards the function of the tubes it is doubtful whether it can exist unimpaired and there is a question as to allowing such a patient

to become pregnant for fear of starting tuberculous processes. If there is no general peritoneal tuberculosis the treatment of the tuberculous salpingitis is the same as that of other forms. The postoperative treatment is important and attention should be given carefully to hygienic conditions.

X-Ray Treatment of Uterine Fibroids. SAMUEL STERN, New York. *American Journal of Obstetrics*, September, 1915.

From the viewpoint of the Roentgenologist, Stern concludes that there are no dangers inherent in the treatment of uterine fibroids by the x-ray. To establish a permanent amenorrhea, he favors massive dosage as being quicker and more satisfactory than the fractional dosage method. The latter method is to be preferred, however, in young women in whom the desired results are a diminution in the size of the fibroid, a temporary amenorrhea and a re-establishment of menstruation. These patients may subsequently conceive and have normal pregnancies and labors. All uncomplicated cases are amenable to x-ray treatment, and the nearer the patients are to the menopause, the surer and quicker are the results. Stern believes that in such cases, under proper treatment, 100 per cent. cures may be anticipated.

The Choice Between Operation and Roentgenization of Uterine Fibroids. ROBERT T. FRANK, New York. *American Journal of Obstetrics*, September, 1915.

Frank lauds the use of the x-ray in the control of the obstinate menorrhagias and metrorrhagias of puberty, but believes that in the treatment of fibromyomata their use is less necessary, although valuable within strict limitations. He is opposed to Roentgenization in the presence of rapidly growing tumors, in cases of metrorrhagia in which complete preliminary curettage with microscopical examination is not feasible, in complicated cases in which ovarian or adnexal disease cannot be excluded, and, finally, in cases of fibroids complicating pregnancy. The expense of the treatment and the time involved must also not be overlooked. The x-rays may be used, he believes, when operation is refused or when serious cardiac, renal or pulmonary lesions exist or when extreme psychic unrest is present. These contraindications would limit the use of the rays to five or six per cent. of all patients having fibroids.

Contracted Pelvis and Difficult Labor. MARK HORNSTEIN, New York. *American Journal of Obstetrics*, September, 1915.

Hornstein favors a test of labor in women whose small external pelvic measurements are all proportional with an external conjugate of 15 cm. or over, provided the small stature of the woman accounts for the small pelvis. Small children are likely to be the rule, and if there is a favorable presentation, spontaneous delivery is likely. Cesarean section for relative contraction in a primipara means repeated Cesareans for subsequent children, whereas extraction, even if it should result in a stillbirth, will enable the woman to deliver her subsequent children herself, since much of the resistance encountered in primipara is due to the soft parts. The author defines a fair test of labor in a doubtful case as four to six hours of active labor with the membranes ruptured, although, he says, three hours will usually decide the outcome.

Radiotherapy in Cancer of the Uterus. A. MARTIN, Berlin. *Jahreskurse für ärztliche Fortbildung*, July, 1915.

(Continued from the October issue.)

Concerning the Technique of Actinotherapy in Carcinoma.—The homogeneous raying of F. Dessauer has been a decided step in advance along the line of carcinotherapy. The object of his improved technic is to affect all the parts of the tumor as uniformly as possible. The Roentgen tubes are calculated to produce rays that should be identical with the x-rays of radium and mesothorium. By means of the Dessauer apparatus, Bumm and Warnekros, the most experienced workers in x-ray therapy of uterine carcinoma, have succeeded in curing six cases of cervical cancer treated for a period of three to five weeks through

the abdominal wall alone. They also demonstrated that the tumor could be influenced by the x-ray at a depth of 9 cm. Amann reported similar results. The patients treated by x-ray through the abdominal wall received as much as 5,000 x, measured according to Kienböck, within a period of five weeks. The abdominal wall was divided into 12-16 skinfields, of which each received as much as 140 x at a time and up to 400 x for the whole series. The tubes were charged with 4.5 milliamperes and the focal distance from the skin was 21 cm. The filter employed was 3 millimeter aluminum. The skin reaction was remarkably slight by comparison with the effect of other methods of raying. Bumm observed after a dose of 500 x to a skinfield some blistering, which disappeared, leaving the skin intact and smooth after three to four weeks. Martin remarks that such skin injury would be an immeasurably small price to pay for the cure of a cancer, but whether other injuries may not later appear still remains to be seen.

A combination of diathermia with large doses of x-ray has been reported by Warnekros. The positive electrode is introduced into the cancer or in contact with it. The negative electrode is held at the buttocks away from the cone of rays. The effect of the diathermia is to sensitize the tumor-cells, as claimed by Christoph-Müller-Immenstadt, by causing increased local heat and hyperemia. The dose employed was 1,100 x per skinfield for six days. Warnekros claims there was not the slightest skin reaction during an observation of three weeks. This combination treatment has also been claimed by Koblack to work favorably when radium is employed.

The dose of radium and mesothorium has been worked out chiefly by Döderlein. The minimum dose, according to him, should be for carcinoma of the uterus, 50 mg. of radium and mesothorium. In very large cervical cancers occasionally 200-300 mg. were inserted. This is left *in situ* for twenty-four hours, at first is repeated at two weekly intervals, later at three to four weekly intervals. The filter used was brass lined with rubber. To prevent injury of the vagina and rectum the filter capsule was placed into an appropriate portion of a kolpeurynter adapted to the size and elasticity of the vagina. The bag was filled with lysoform in each case. A thorough excochleation of the cancer is made before the radium or mesothorium application. The results are better in the more superficial growths. The infiltrating types of cancer are as resistant and unfavorable as they are to surgical operations.

In February, 1915, Döderlein reported twelve cases of inoperable cancer which were entirely well one year after cessation of treatment.

The Schauta Klinik, Vienna, uses radium in inoperable cases and in operable cases that refuse surgical treatment. Excochleation by means of the Paquelin cautery is done at the beginning of the treatment. Then 50 mg. of radium is introduced for twelve hours, with intermission of twelve hours to several days. The first series consists of five applications. After three weeks to a month a second series of four or five applications is begun, and if necessary is followed by a third series of five sessions. The dose decreases after each series. Where superficial effects are desired, the filter is lead, in certain small tumors the filter is of gold, while for deeper effects platinum or brass is used.

Of thirty-four cases treated by this technic, eighteen completed the full course of treatment. One died of pyemia with multiple lung abscesses—the carcinoma was no longer macroscopically visible. Three women remained unimproved; fourteen were considered to be primarily cured. Nine cases were carcinoma of the cervix, two of carcinoma of the body, two of carcinoma of the rectum, and one carcinoma of the vagina. In no case were untoward symptoms noticeable, i. e., outside of slight temperature elevation, mild cystitis and transient loss of appetite and disturbance of the bowels as well as backache and abdominal pain. In general the discharge and hemorrhage ceased promptly, the pains rapidly improved, the general condition, blood-picture and body-weight improved. No fistulae were observed. The course of treatment lasted 1½ to 2½ months. Observation of these patients up to the time of publication was 6 to 10 months.

The Schauta Klinik does not regard their technic as by any means perfected. They also employ as prophylactic measure radium in 50 mg. doses about ten days after carcinoma operation. The application lasts ten hours and is repeated at intervals of a month.

G. Klein has combined the use of mesothorium or radium with the intravenous injection of chemical substances such as enzytol and radium, barium, selenat (Merck) with the further Roentgenization. Enzytol appears to lend to skin-burns because of its sensitizing effect on the skin. The future will best determine the value of such combined treatment. Of Klein's series of 100 cases (25 operable uterine carcinoma, 59 inoperable uterine carcinoma, and 16 breast carcinoma), 28 were so far cured, partly primary, partly secondary, 30 were improved, 11 were worse, 23 died, of whom the terminal end in 8 cases is unknown. Klein finds his method contraindicated in very large cancer or sarcoma of the body of the uterus, and even dangerous in mammary carcinoma, with massive infiltration of the axillary glands which probably involve the large vessels and nerves.

The expense of the treatment, according to Sachs, to the practitioner of the individual case receiving 7,000 r approximates about \$750. Van der Welde confirms these figures out of his own experience. He also notes that the difference in expense as claimed by the manufacturers, and so encountered by the practitioner, is a vast one.

The end result: So far one may speak only of primary results with Roentgen and radiotherapy. With the increased, very large doses it may be possible to achieve secondary and permanent results. By means of radium and mesothorium treatment, post-operative in 58 cases of uterine cancer, Scherer succeeded in keeping 48 cases free from recurrence three years after operation. The permanent results will naturally improve the smaller is the primary operative mortality. Thus Schauta's very satisfactory results with his improved radical vaginal cancer extirpation the past six years was only 4 per cent.

Operation vs Raying of Operable Uterine Cancer.—Some authors have stopped operating operable cancers of the uterus and have begun with actinotherapy. Thus Amann, Klein and others claim satisfactory results without first extirpating the uterus. Hofmeier, however, has had at least one most disastrous effect from a combined primary treatment of an adeno-carcinoma of the cervix with radium and Roentgenization. The tumor in this case was favorable for operation. After three weeks' treatment, during which 2,000 mg. hours of radium and 250 r of Roentgen-rays were given, Hofmeier was obliged to operate and found a great activity of the growth. Despite further radium treatment and Roentgenization, in all 30,000 mg. hours and 2,630 r during a period of four weeks following operation the metastases were overwhelmingly widespread. Fehling takes a very cautious attitude toward primary radiotherapy, and Von Franque shares the same feeling.

There is a great number of women alive today who owe their life and well-being to ray-therapy. In inoperable cancer of the uterus actinotherapy has proven of undoubted benefit; in operable cases a similar therapeutic value of the x-ray, radium and mesothorium remains yet to be established.

The Initial Strain in Weak Foot. PERCY W. ROBERTS, New York, *New York Medical Journal*, August 28, 1915.

Roberts believes that the inner surface of the os calcis plays an important rôle in the causation of weak foot. The tilting of the convex surface of the os calcis outward results during periods of standing. Under such conditions the normal play of the calcaneo-astragalar joint allows the astragalus to slip downward and inward, thus shifting the thrust of the body weight just a trifle on the inner side of the center of balance of the rounded under surface of the os calcis. With this theory in mind, Roberts has been using a plate that grasps the os calcis, tilts it, and holds it in an overcorrected position. The plate extends only to the anterior border of the bone, and it does not depend upon any crutch effect under the arch. The results obtained have thus far been very satisfactory.

Late Results of Operation for Correction of Foot Deformities Resulting from Poliomyelitis. H. W. MARSHALL and R. B. OSGOOD, Boston, *Boston Medical and Surgical Journal*, September 9, 1915.

Twenty-three patients from the total number of twenty-six were distinctly improved after their surgical experiences, although such results perhaps will seem rather unexpected to persons who have witnessed and made comparisons between healthy normal individuals and results of operations seen in infantile paralysis cases. Poor as some operations appear to be at first glance when judged from this standpoint, nevertheless they usually show increased usefulness if compared with previously more deplorable conditions that existed in each instance. Patients themselves agree with these medical judgments, and errors in the casual observations of disinterested persons rather than inefficiencies of surgical procedures must be held responsible for many bad impressions received of results of operations.

Among the twenty-three beneficial results there were four excellent ones, ten good ones, six that showed moderate improvement and three with slight betterment.

One of three unsuccessful results may be explained, in part, at least, as due to this patient's neglect and failure in having post-operative supervision. He relapsed into his former condition and the other two seem slightly worse than previously to their operations.

It is of interest to observe that there were no overcorrections of deformities following tendon transplantations in this series, the usual result being partial correction accompanied by some functional improvement and with only occasional perfect success and complete restoration of function. Over-correction of deformities, however, occur, as demonstrated by the single previously over-corrected case, which was subjected to a second corrective operation to overcome the first bad result.

These late conditions indicate in a general way what may be expected from surgical treatments of fairly complicated infantile paralysis cases in a large hospital where there are a number of different operators and division of responsibilities in the after-care of patients. These statistics, however, are far too meagre and incomplete to possess weight in comparison between individual control of patients from beginning to end and cooperative direction of treatments by groups of physicians. All that can be said is that with a fair degree of cooperation methods herein described have proven themselves reasonably safe and successful.

Reinforcing Paralytic Flail Joints by Intra-articular Silk Strands to Limit Motion and Increase Stability. BERNARD BARTOW, Buffalo, *New York State Journal of Medicine*, September, 1915.

Tunnels are drilled in the articular ends of the bones, the drill being at the same time carried into and through the joint. Through these tunnels strong paraffined silk strands are drawn. Small puncture incisions are made in the soft tissues at points where the drill enters and emerges from the bones. Between those points, (e.g., in the knee), the soft tissues are tunnelled close to the articular ends of the bones and capsule, and one end of the silk strand is then drawn back by means of a leader to the point of entrance—both ends being tightly tied. One-half of the strand therefore lies in the tissues external to the bones, but whenever practicable the return strand, for the purpose of tying the ends, should also pass through the capsular tissue of the joint.

Inserted in the anterior or posterior aspect of, e.g., the knee, and tightly fastened, the silk strand acts as a check band to maintain the leg in either extension (in drop knee) or flexion (in genu recurvatum or "back knee"), according to the situation of the paralyzed groups.

Bartow says that this method has been used by him merely for flail conditions in the knee, shoulder and hip. Immediately following the operation, the acute surgical reaction is controlled by immobilization with plaster of Paris casts, except for the shoulder, where only the usual soft bandage dressing is employed.

The stability of the joint is not only maintained by the silk, and also after the silk thread has lost its tension by the reactive scar contusion that forms around it.

Bartow used this method in 150 cases, in none of which has there been mortality or any other untoward result. Results have been highly satisfactory.

Acute Nonepidemic Inflammation of the Sublingual Glands in Children: An Affection of Unknown Origin. HAROLD NEUHOF, New York. *American Journal of Diseases of Children*, August, 1915.

Neuhof gives in detail the findings in three cases of sublingual gland inflammation, which he believes differ from any previously described variety. An observation of about a dozen such cases leads him to conclude that they belong to a definite clinical group of non-epidemic inflammations, the characteristic features of which are as follows: Sudden onset of sublingual and median submental swelling with wild febrile manifestations; scattered red spots in the mucous membrane over the sublingual swelling, interpreted as inflamed orifices of the sublingual ducts; rapid increase in size, often to grotesque proportions, of the moderately painful submental swelling, frequently accompanied by pronounced reddening of the overlying skin; early recession of the sublingual swelling, contracting with persistence of the submental tumor for one to three weeks; fever slight, and general condition good throughout the course; no complications, sequelae, or recurrences.

The Administration of Glucose Solution as a Prophylactic against Post-Operative Shock. A. C. BURNHAM, New York. *American Journal of the Medical Sciences*, September, 1915.

In order to combat the frequent acidosis following anesthesia and starvation consequent upon operation, a condition supposedly associated with shock, Burnham recommends the administration of glucose solution immediately after operation. The glucose may be given intravenously, hypodermatically or by rectum. The latter method is preferable. It is given in 5% solution, dissolved in ordinary tap water, twelve to sixteen ounces being introduced during operation, and its administration continued by the Murphy drip method after the patient has returned to the ward. From 300 to 500 calories a day may be introduced without discomfort to the patient. The author concludes: (1) Glucose solution should be given as routine after every operation in which we have reason to fear more than the ordinary amount of post-anesthetic shock; (2) it should be given as routine in every case where post-operative oral feeding may be difficult or insufficient for a considerable period after operation; (3) it should be given as an emergency measure either before or after operation for the relief of an existing or threatened acidosis.

Quinine and Urea Injections in Hyperthyroidism. L. F. WATSON, Oklahoma City. *Journal of the American Medical Association*, September 25, 1915.

Watson makes a later report of the use of quinine and urea injection over 200 times in fifty cases of goiter with no unpleasant effects. He recommends the method only to relieve the hyperthyroidism and not to remove the goiter, though in small toxic and atoxic cases the tumor may disappear. The injection must be used with discretion; its indiscriminate use by an inexperienced person might have had results. The use of local anesthesia cannot be too much emphasized, and he precedes it in all toxic cases with preliminary injections, into the most prominent parts of the goiter, of a few minims of sterile salt solution, followed by sterile water injections. Two to four preliminary injections will accustom the patient so that the quinin and urea can be safely given with slight discomfort. As soon as no hyperthyroidal reaction follows the water injections their usefulness is over. After the anesthetization of the site of the injection with a 0.1 per cent. cocain, or an 0.25 novocain solution, the needle is carried down to the body of the goiter and in cases of hyperthyroidism he usually gives from 1 to 4 c.c. of a from 30 to 50 per cent. quinin and urea solution at a treatment, repeating the injections every third day, according to the progress of the patient. From eight to fifteen infiltrations are usually necessary to bring about marked improvement. In cases of recent cystic goiter with moderate hyperthy-

roidism he aspirates the fluid and makes from 1 to 3 injections. To cases of severe toxic goiters removed after injection are briefly reported. Analysis of some of his cases already treated is given. In his conclusions he says the injections will not relieve advanced cases when the vascular and nervous system have been permanently damaged, and, while the method is harmless in experienced hands, it should be used only in a hospital. The gradual improvement of the exophthalmos in certain patients following the treatment points to a nerve control by the thyroid on the exophthalmos through the sympathetic nervous system. Watson believes the greatest field of usefulness of the method will be found in cases of beginning hyperthyroidism not severe enough to justify operation and as a preparatory measure to partial thyroidectomy when the patient is too ill to warrant immediate operation.

Acute Tubercular Inflammation of the Ileo-colic Glands, Simulating Appendicitis. HOMER GAGE, Worcester, Mass. *The Boston Medical and Surgical Journal*, August 26, 1915.

Gage records twelve cases with this malady. Invariably the symptoms are those of an acute attack of appendicitis. In no case was a palpable tumor present. Four of the twelve cases were between seven and twelve years of age; seven were between sixteen and twenty-five. The enlarged glands, in the ileo-cecal region, were at times injured at operation, showing cheesy contents. In a number of instances there had been a history of one or more previous attacks of appendicitis. Indeed, Gage says that the simulation is so close that a differential diagnosis is almost impossible. The appendix was removed in nearly every instance, but no tubercle bacilli could be found, as far as could be determined in lesions as found in the cecum; this proves that the tubercle bacilli may pass through uninjured intestines. The technic of the operation consists of simple appendectomy plus the dissection of the infected glands. The prognosis is good, since only one of the twelve patients developed a tuberculous taint.

Gas Phlegmons in Roentgen Pictures. (*Gasphlegmonen im Röntgenbild*). M. MARTENS, *Berliner Klinische Wochenschrift*, July 19, 1915.

Martens demonstrates in a number of plates how easily gas phlegmons of the deeper tissues may be recognized by the x-ray. The value of this method consists in the fact that more extensive incisions become necessary in order to counteract infection. Martens comments on the frequency of gangrene following gas bacillus infection, and the consequent frequent necessity of amputation.

Roentgen-ray of Exophthalmic Goiter. C. A. SIMPSON, Washington. *Medical Record*, September 4, 1915.

Simpson records eight cases treated by x-ray, in all of which he obtained prompt improvement. He arrives at the following conclusions:

1. Many cases of exophthalmic goiter are associated with enlarged thymus glands and this association often causes serious postoperative symptoms and even death.
2. While such an association will seriously complicate and prolong a surgical operation, it offers no such added difficulties for the Roentgen therapist.
3. Not only such ductless glands as the ovaries and testicles but also the enlarged thyroid and thymus glands as well are very sensitive and may be atrophied by the Roentgen ray.
4. This theory has been amply proved by laboratory experiments and clinical results in many cases of hyperactivity of the thymus gland seen in cases of status lymphaticus and hyperactivity of the thyroid gland—exophthalmic goiter.
5. If these cases of status lymphaticus and exophthalmic goiter will give the Roentgen ray a fair and impartial trial the majority of them will be relieved of all troublesome symptoms and make unnecessary a disfiguring, dangerous and often futile operation.
6. The above findings are not entirely my own hastily formed ideas but include the results of several hundred cases of exophthalmic goiters that have been successfully treated by the Roentgen ray, the literature of which is open to all who may care to investigate it.

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THE SIGNIFICANCE OF PYLORIC SPASM.*

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Foreword.—In spite of the large number of communications upon disorders of the stomach that have appeared in the medical press during the past few years, there has been no noticeable diminution in the mortality statistics of the serious gastric diseases. The discouraging situation confronts us that early diagnosis of really serious stomach affections is the exception.

Years elapse before duodenal and gastric ulcers are referred to the surgeon for treatment, and months pass before cancers are even suspected.

Possibly the medical profession is not altogether to blame for such a situation.

The average text-book description of gastric and allied conditions, in its attempt to be concise and furnish a distinct picture of the disease under discussion, must present a clinical entity, but it is one that fits the terminal stages of the particular disease.

The early and irregular manifestations of the condition have to be omitted because they are also the first symptoms of many other affections.

We are, consequently, not on the alert to fathom the real cause of such common symptoms as the patient details to us. This is especially true in regard to pyloric spasm. We are so used to accepting a symptom-complex as distinctive of a particular disease that naturally we expect to find one picture for gall-stones, another for appendicitis, another for duodenal ulcer and another for ulcer of the stomach.

We may be surprised to find that all of these different lesions at some time in their history give exactly the same gastric symptom-complex. This has happened so frequently in the past, it is such an easy error to make, that it is usually only after we have made it a few times we realize the truth

of the foregoing and seek to find out why widely different lesions may have such a group of common symptoms.

All of the diseases which I shall presently enumerate have a number of similar gastric symptoms.

These symptoms are produced by or result from a single cause, which is a spasmodic closure of the pylorus. I deem this subject of sufficient practical importance to justify its careful consideration.

Definition.—By pyloric spasm is meant a spasmodic contraction of the pyloric ring, the pyloric canal or both.

It may be brief with irregular recurrences, or last a long time and be almost continuous.

Anatomy.—The terminal portion of the stomach presents the pyloric antrum, pyloric canal, pyloric ring and its opening, the pylorus. The pyloric canal and sphincter or ring are the parts with which we are especially concerned. The pyloric canal and ring show a gradual increase in the thickness of the circular fibers of muscle until a maximum thickness is attained at the pyloric ring, forming the sphincter muscle. Here the circular fibers abruptly terminate, leaving the duodenal surface of the pyloric ring practically like a transverse diaphragm perforated by the pyloric orifice—the pylorus. This massing of circular fibers at the pyloric ring forms the pyloric sphincter, constrictor pylori. This region also presents the longitudinal muscular coat. The superficial fibers of this layer are continued onto the duodenum, the deeper fibers extend between the bundles of the circular muscle and constitute one-third of the thickness of the sphincter (Rüdinger) and act to dilate the pylorus, hence the name of dilator pylori.

The internal lining of these parts is by mucous membrane of the stomach, and their superficial covering is peritoneum. The more intimate anatomy of these structures does not bear upon the matters in hand.

The nerve supply is very important; it is from three sources—the pneumogastrics, sympathetic and the intrinsic plexuses of Auerbach and Meissner. The pneumogastrics convey both tonic and motor impulses; the sympathetic is inhibitory, while the plexuses of Auerbach and Meissner are both inhibitory and motor. This extensive nerve supply for

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the stomach places that organ in direct or indirect communication with all of the vital organs. When we contemplate these extensive communications we cease to wonder why the stomach is so often disturbed, but rather we marvel that it is not affected more often than it is.

The stomach not only responds to the effects of diseases that are limited to itself, but it also shares in very many pathological conditions, both near and remote, by symptoms which in the gross are similar to those caused by its own affections. The differentiation of the real source of these gastric symptoms is seldom easy and often impossible, without actual inspection of the organ through an abdominal incision.

Physiology. — The normal function of the stomach has been a problem difficult of solution. The first real insight into the mysteries of gastric function was obtained by Dr. William Beaumont through the person of the now celebrated Alexis St. Martin. Dr. William Osler, writing the introduction to the *Life and Letters of Dr. William Beaumont* by Jesse S. Myer, calls Beaumont "the first great American physiologist." Following Beaumont there has been a host of investigators, yet with all the aids of recent years at their hands, but few radical changes have been made in the conclusions offered by Beaumont.

The latest text-book on *Physiology*, by W. H. Howell (1915) is authority for the following summary:

Solid food remains in the stomach for several hours and during this time the musculature contracts in such a way that the thinner portions as they are formed by digestion are ejected from time to time through the pylorus into the intestine.

Except at the definite intervals when the pyloric sphincter relaxes the food is entirely shut off from the rest of the alimentary canal by the tonic closure of the sphincters at the cardia and pylorus.

The consensus of opinion is that the fundus is not actively concerned in the movements of the stomach, but serves by tonic contraction to slowly force the food towards the pylorus.

The pyloric region is the mixing and grinding part of the stomach. From time to time this part forces the food into the duodenum.

Small contractions begin in the middle of the stomach soon after food is taken and run toward the pylorus. These contractions appear at regular intervals of about 20 seconds.

These peristaltic waves grow more forcible towards the pylorus and also increase in force as digestion progresses. These movements mix the

food with the gastric juice forming a thin liquid—the chyme.

At certain intervals the pyloric sphincter relaxes and chyme is squeezed into the duodenum with considerable force. The mechanism controlling the pylorus is obscure. Relaxation of the sphincter does not occur with each contraction wave, but at irregular intervals. Cannon connects it in part with the consistency of the food, but mainly with the effect of the hydrochloric acid in the gastric secretion.

Hydrochloric acid in the stomach favors relaxation of the pyloric sphincter, in the duodenum, closure of the sphincter. Closure is maintained until the chyme in the duodenum is neutralized.

The old view of the rotary movements in the stomach is not correct. The food lies in the fundus and is not churned up. It may remain undisturbed for a long time and escape mixture with the gastric juice.

Different foods leave the stomach at varying times. The carbohydrates pass out of the stomach soon after ingestion. They require only half as long a time as the proteins for gastric digestion.

The fats remain longest in the stomach when taken alone. When combined with other foods fats retard their exit from the pylorus.

This distinct difference in the behavior of the main foods can hardly be referred to mere mechanical consistency since the fats are liquefied by the heat of the body. The regulation of the stomach movements is not through the extrinsic nerves for they are the same after section of the vagi and splanchnics. These movements rather depend upon a local mechanism in the stomach itself.

I cannot pass over the conclusions of x-ray investigations of the stomach, especially those conducted by Dr. Cole on apparently normal stomachs after an ordinary meal. I consider his observations upon the action of the stomach and duodenum of great value. Cole first claims that the first part of the duodenum—which he has called the cap—is embryologically, anatomically and physiologically a part of the stomach. The function of the cap is that of a reservoir. In relation to the action of the sphincter, Cole says that it is with the greatest timidity he approaches the subject because its function has apparently been so conclusively established, yet the roentgenographic evidence is so significant that it cannot be ignored. A study of his (Cole's) plates, over 12,000, shows that during the systole of every gastric cycle the pylorus is open, and through its lumen a small amount of the liquid chyme is propelled into the reservoir cap. This

period of expulsion consumes approximately 7-10ths of the cycle. The other 3-10ths is occupied by the diastole.

The descending duodenum obtains ingesta by means of broad peristaltic contractions which withdraw the chyme from the reservoir cap, where it collects after being expelled through the pyloric sphincter. Duodenal peristalsis occurs periodically, but not coincidentally with or at the same rate as gastric peristalsis. During the early stage of digestion this process takes place very rapidly, because the contents of the cap are only slightly acid and mostly fluid.

Etiology.—Pyloric spasm is an *intermediate* step between *cause* and *effect*.

The cause of the spasm is a reflex nerve stimulus. It may arise in a great many ways and from numerous sources.

Brown has carefully studied the condition and gives eleven sources from which pyloric spasm may result; they are the following:

1. Non-bacterial toxic disturbances. Diabetes, gout, nephritis. Also, certain bacterial infections, infectious fevers, tuberculosis and acute endocarditis.
2. Certain irritations of the cerebrum: tumors, abscesses, hemorrhages, embolisms and emotional states.
3. From the pharynx, larynx and lungs: whooping-cough, tuberculosis, aneurism, goiter.
4. The stomach itself: gastritis, dilation, pyloric stenosis, ulcer and cancer.
5. The liver and gall-bladder: gall-stones, hepatitis, hepatic colic.
6. Kidneys: nephritis, pyelitis, renal colic and floating kidney.
7. Pancreas: pancreatitis, inflammation and cancer.
8. Uterus and adnexa: pregnancy, displacements, inflammation, stenosis of the cervix.
9. Bladder and prostate: inflammation of either.
10. Acute infections of the peritoneum.
11. Intestines: duodenal ulcer, appendicitis, parasites, obstructions, hernia, etc.

With such a multitude of sources from which irritation may be expressed by a spasm of the pylorus and the attending symptoms, it certainly offers a wide field for the play of our diagnostic ability.

With the commoner sources we are more or less familiar, and have no great difficulty in associating cause and effect. But with many of the more obscure and less frequent sources we often make errors.

McGuire attributes pylorospasm to rapid eating.

indigestible food, ulcer or other lesion of the stomach, but most frequently to some remote abdominal disease. He also says that it has never been satisfactorily explained how appendicitis or cholecystitis causes gastric symptoms. It is believed that irritation transmitted to the stomach through the sympathetic nervous system causes an excess secretion of the H. Cl. This causes spasm of the pylorus. The pyloric spasm causes retention of food beyond the physiological limit, finally there is motor insufficiency, food stagnation and dilation of the stomach.

Lerche states that almost every case of florid gastric ulcer was accompanied by a disturbance of motility due to spasm of the pylorus, and that Doyen expresses himself to the effect that the pylorus is the dominating factor in the pathology of the stomach, i. e., through the spasm.

Symptoms.—First, normal gastric function will be seriously interfered with.

Pain in the epigastrium is one of the constant symptoms. It varies with the intensity of the muscular contraction. It is caused by the abnormal pressure upon the nerves compressed by the sphincter, it is also exaggerated by any accompanying spasm or dilatation of the stomach. The pain is located in the epigastrium. It may be reflected along the splanchnic nerves to the back. Its nature is colicky, cramp-like, or a feeling of pressure.

The stomach symptoms are the usual ones of disordered digestion: discomfort, eructations of gas or sour and acrid fluid. Vomiting is common, spontaneously or induced by the patient for the relief it affords to empty the stomach. The condition may go so far as to resemble a real pyloric stenosis.

To make a differential diagnosis between spasmodic and true stenosis of the pylorus is at times very difficult. Many cases are on record where operation was performed with the diagnosis of carcinoma and obstruction to find an apparently normal pylorus, but the symptoms returned after recovery from the anesthetic, proving the spasmodic nature of the condition.

Bastedo says that in cases of pure pyloric spasm without organic lesion at the pylorus, we note the absence of relief on taking food or alkalies, the non-relation of pain to the time of digestion (two or four hours after eating) and the lack of marked tenderness to finger-point pressure in the duodenal or pyloric region. Moreover, we are apt to get a history of equal distress from small meals or large, and at times no distress at all when a particularly large and varied meal is eaten in pleasant company.

Hartmann in a paper on gastric and duodenal

ulcers states that late pain, a painful sensation of hunger relieved by the taking of food, which suffices, according to Moynihan, to diagnose duodenal ulcer, belongs in reality to the symptom-complex of pyloric spasm, whatever may be the cause of it. He says further, that pyloric spasm, whether due to a gastric or to a duodenal ulcer, gives these sensations of late pain coming on from 3 to 4 hours after meals, often at night, with a painful sensation of hunger relieved by the ingestion of some food. Stockton says that "hunger pain" is due to spasm of the pylorus.

Jones, discussing "hunger pain," states that there is a popular impression that "hunger pain" occurs only with an empty stomach, but it is usually at its height with a highly acid chyme, which passes through the pylorus slowly and with difficulty. The retarded passage into the duodenum of the stomach contents may be due to pyloric spasm.

Hunger pain may be associated with achylia gastrica. It is present in gastrectasia, and is quite often found in cases of gastroptosis, enteroptosis or nephroptosis.

It may also occur in gastric suffering long after eating resulting from a variety of chemical and nervous disorders of the stomach, and in disease of other organs, as the gall-bladder or appendix.

Diagnosis.—The first question to be settled is, is the stomach the organ at fault?

To answer this we must first have a complete history of the case. Such a history will bring out other symptoms than those essentially gastric.

It is safe to say that a careful history will eliminate all the lesions above the diaphragm, and those constitutional diseases that have stomach symptoms as a prominent feature.

Second. A thorough physical examination will give us important information and lead us nearer the goal. By this examination the mouth, throat, chest, abdomen and pelvis are thoroughly interrogated.

Enlarged thyroid, heart incompetency, floating kidney, retro-displaced uterus, chronic appendicitis, gall bladder disease and essential trouble in the stomach may be tentatively selected as the origin of the spasm.

While there are so many conditions that may produce pyloric spasm, there are only a few which commonly do so. It will be comparatively easy then to exclude on the basis of the history, physical examination and the urinary findings, all conditions except lesions in the stomach itself, in or about the gall bladder and in the region of the appendix.

These pathological states will need a further in-

spection. A chronic appendicitis is one of the commonest causes of pyloric spasm. I have had many such cases. That there may be associated with this disease a genuine ulcer of the stomach or duodenum is possible. Further investigation with the x-ray will determine such a combination.

However, if the appendix is at fault alone, besides the constipation, drag in the right side and down the right leg, there will be tenderness on pressure over the appendix and, as pointed out by Aaron, pressure over the appendix causes (reflexly) the epigastric pain and distress from which the patient seeks relief. Aaron states that while examining a patient with chronic appendicitis with the fluoroscope, when he made pressure over the appendix he found he could induce a spasm of the pylorus. This pressure also produced the reflex pain in the epigastrium of which the patient complained. He says he is inclined to believe that this pain was due to the spasm of the pylorus.

If the lesion causing the pyloric spasm is located in or about the gall bladder, we may be unable to be sure of the diagnosis unless gall stones have been passed, or are shown by x-ray, or there is a history of the typical biliary colic with the characteristic pains radiating to the back and right shoulder, or unless jaundice has been or is noted. Further the x-ray might show adhesions in the region of the gall-bladder, pulling the pylorus to the right.

One of the most marked cases of pyloric spasm I have ever had occurred in a nurse, who gave a perfect ulcer history even to the hunger pains at night. But of course there was no blood in the vomitus or stool and a careful x-ray photograph showed persistent shadows in the region of the gall-bladder. I removed 36 gall stones. The entire region was free from adhesions or indications of any trouble and she has been completely cured by the operation. As all ulcers, scars, adhesions, tumors, cancers of the duodenum and stomach are accompanied by pyloric spasm, in fact as symptoms of such gastric disturbances are brought about by pyloric spasm, it is not necessary here to repeat the symptomatology of these conditions. This should be said, that careful gastric analyses after the method of Gluzinsky should be made, that x-ray photographs of the stomach must be had and that if after two weeks of patient treatment the diagnosis is not clear, an operation should be done to make the diagnosis. If a diagnosis can be made earlier, and the condition is an operable one, of course, I do not mean in such instances that there should be a delay at all. Such cases may require immediate surgical relief.

Speaking of the diagnosis of ulcer Graham says that chronic recurrent appendicitis is the type that stimulates ulcer of the stomach. The pain is not referred to McBurney's point, and often no appendicular tenderness can be elicited. The gastric symptoms are due to pyloric spasm. The pain may be purely reflex or due to the spasm.

Pain, vomiting, gas, increased secretion and sour eructations all follow pyloric spasm, whatever its origin, and the stomach reactions, whether due to pyloric spasm or obstruction, must give the same symptoms.

To further illustrate the uncertain nature of gastric symptoms I wish to introduce some quotations from leading men. Deaver says "of all the organs in the abdomen the stomach presents the greatest variety of symptoms and the most difficult to analyze. Insignificant chronic disease of the appendix may set up a pyloric spasm with pain, retention, fermentation and secondary gastritis."

Joseph Sailer is astonished how often patients with valvular heart disease and with tuberculosis of the lungs come to the physician complaining of gastric symptoms.

A. C. Morgan regards the term "dyspepsia" as a very dangerous one, because this condition is not present, but the stomach is giving us warning of trouble elsewhere.

S. Solis Cohen states that several times he has been unable to exclude appendicitis, gall-stones or gastric ulcer without exploratory operation.

Robert T. Morris mentions "two cases operated by famous surgeons for gastric symptoms warranting operation, but nothing was found." Eye strain was found to be the cause of the symptoms in one case as relief of the eye strain caused rapid disappearance of the gastric symptoms.

I hardly think it necessary to multiply instances. The point I wish to emphasize is that it is vitally important that we have in mind most of these sources of pyloric spasm so that we will not too readily jump at the diagnosis of ulcer whenever a patient starts off his history with the statement that he has indigestion, etc.

Treatment.—It is obvious that to determine the cause of the pyloric spasm determines the line of treatment: whether medical or surgical. With the medical treatment, I shall have nothing to do. The subject is too extensive.

If surgical measures are to be utilized, we must choose between mechanical and operative.

Mechanical means may be used to advantage in some cases of prolapsed kidney, intestine or stomach or in the case of a retroflexion of the

uterus. If relief to the symptoms is obtained by a belt or a pessary, the knife is not needed. However, for most of the conditions usually responsible for pyloric spasm, as chronic appendicitis, gall-bladder disease and ulcers of the stomach or duodenum surgery must be invoked to achieve a cure.

So far as malignant disease of the stomach is concerned, whether pyloric spasm is a prominent feature or not radical operation is indicated at the earliest moment after the diagnosis.

As to what the technic shall be for these various surgical procedures, I shall have only the briefest references, as that is really another subject.

I wish for the moment to concentrate attention upon the burning question of the proper treatment of gastric and duodenal ulcers. That pyloric spasm is the chief symptom-producing agency in these conditions has been emphasized. That relief of the spasm may be obtained by diet, alkalies and anodynes may be possible.

That such relief of symptoms constitutes a "cure" of the ulcer, meaning a healing over of its raw surface, is possible, but as a matter of fact is very unusual. The unanimous opinion of our best surgeons is to the effect that the medical cure of an ulcer of the stomach or duodenum is very problematical at the best, some may even doubt that it ever occurs. Granting that the ulcer is curable by medical means, we do not know how long such a "cure" will last or when cancer will supervene.

I am disposed to consider this subject of the proper treatment of duodenal or gastric ulcer a little further, even though it may carry us farther afield than the scope of this paper justifies by reason of the paper published last May by Sippy upon the medical treatment of this condition. His paper is a strong argument for the medical treatment of gastric and duodenal ulcer. I have read his paper several times and am still unconvinced of the soundness of his contentions.

That the early ulcer may be cured by the measures he advocates is possible; but, that such measure will heal the old, chronic, indurated ulcers we are called upon to relieve, I do not believe.

The situation appeals to me something like this:

There are 26,000 people dying each year in the United States alone, from cancer of the stomach. At least 70 per cent. of such cancers have developed upon an ulcer base. Claiming only 50 per cent of cancers arising from a preceding ulcer the mortality is still appalling—13,000 people dying in our own country from gastric cancer, following a gastric ulcer.

These cases, in many instances, give a history

of years of stomach distress for which various plans of medical treatment have been used, yet malignancy develops and death results.

We know that it is not humanly possible to detect the time when malignancy begins in an ulcer.

The only way that any improvement can come in the statistics of gastric cancer is to operate all cases of ulcer as early as possible. Nothing but early excision has been found yet to offer any hope of cure in cancer wherever placed.

The present propaganda of the profession is directing the attention of medical men and the laity to the early signs of cancer and to the necessity of early surgical intervention.

Stomach cases coming to us with a history of years of suffering are not proper subjects for further medical treatment, even if all our diagnostic means point to the presence of an ulcer. No such uncertain method is justified. Something definite is demanded by which such a potential cancer focus may be eradicated.

I feel that the teaching of Sippy is a step backward, a return to uncertain methods, which have ever proven futile when cancer is a probability. Such procrastination is a serious menace to thousands of pre-cancer ulcer patients. I urge, therefore, that all such chronic cases be treated surgically.

If the case is cancer, of course wide excision with a posterior no-loop gastro-enterostomy is an operation of choice.

If an ulcer is found at or near the pylorus, the Rodman operation of a pylorotomy with a gastro-enterostomy, or a pyloric section and an anastomosis of the stomach directly into the jejunum as described by Polya, offers the safest plan of permanent cure.

Should the ulcer be at a distance from the pylorus, the cautery excision of Balfour with or without a gastro-enterostomy should be performed. But the latter, if used, should be placed close to the antrum. Placed at this position no occlusion of the pylorus is necessary.

At times, even with a marked pyloric spasm and a tumor present in which a diagnosis of carcinoma has been made, nothing is found at the operation. The tumor disappears under the anesthetic. These cases of so-called idiopathic pyloric spasm should be operated upon, as when nothing has been done, the spasm returns after recovery from the anesthetic. A linear pyroloplasty or a Finney operation has given me perfect results in a few such cases.

When an operation is performed it is imperative that with or without duodenal or gastric causes be-

ing found apparently sufficient to fully explain the reason for pyloric spasm the entire abdominal contents should be carefully investigated. Especially does this apply to the region of the appendix. The appendix will probably show signs of inflammatory reaction in 8 out of 10 cases. Unless some contraindication arises, the appendix should be removed whether showing gross pathological changes or not. In one such case of mine, the microscopical examination showed a beginning cancer, in another tuberculosis.

It goes without saying that any lesions of the biliary system should receive proper treatment.

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EXTRAGASTRIC CAUSES OF STOMACH SYMPTOMS.

We must not, in our plea for surgery to relieve gastric symptoms, forget that, in a small number of cases, the cause of the gastric condition may be due to some constitutional disease, such as renal, cardiac, hepatic disease, pulmonary tuberculosis and syphilis, also many diseases of the cerebrospinal system. These should be carefully eliminated before we look for the surgical causes of indigestion.—SAMUEL McCLARY, in the *Pennsylvania Medical Journal*.

BLOODVESSEL ANASTOMOSIS: WITH ESPECIAL REFERENCE TO THE USE OF CANULA-FORCEPS.

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Contrary to the inference which perusal of current surgical literature suggests, the inception of vasal surgery is not a recent achievement. "The idea of suturing an artery after it had been injured was conceived by Lembert" (Murphy). Prior to the present perfection of asepsis and aseptic technic, however, vasal operations were most unsatisfactory, the complications and ultimate mortality attending such surgery being much greater than under expectant methods of treatment. Infection, thrombosis, and death, represented the logical sequence of events when the aid of surgery was invoked, whereas at least partial recovery sometimes occurred under expectant treatment.

Arterial suture was first practiced upon the human being by Halowell (1759); Broca (1762) successfully sutured a longitudinal arterial incision; Asmann (1773) twice attempted arterial suture experimentally, both cases resulting unfavorably through obliterating endarteritis; Lee (1865) experimentally punctured an artery to determine how large an opening could be made without fatal hemorrhage, and described a method of arterial repair without suture; Gluck (1883) reported nineteen futile experiments with arterial suture, being unable to control hemorrhage from the needle punctures; he also devised aluminum and ivory clamps for uniting longitudinal arterial incisions, and succeeded with the ivory clamp in one experiment; Israel (1883) united a wound of the common iliac embracing two-thirds of its circumference by inserting fine silk sutures through the entire vessel wall; Von Horoch (1887) reported the occurrence of thrombosis in six experiments, including one of end-to-end anastomosis.

A vast amount of experimental and clinical work along the line of vasal surgery was performed by Jassinowsky (1889); it was conclusively demonstrated by him that injured bloodvessels might be successfully sutured, and their lumina preserved. He concluded (a) that after suture arterial wounds healed by first intention, (b) that primary hemorrhage could be easily avoided by exercising adequate precautions, (c) that thrombosis and secondary hemorrhage need not be feared, (d) that vasal wounds in the vast majority of instances should be sutured, (e) that rigid asepsis was an essential prerequisite to successful results.

Bruci (1889) sutured six longitudinal arterial incisions in dogs, being successful in four; Tansini (1890) endeavored to close arterial wounds by absorbable horn clamps; Muscatello (1890) successfully sutured the abdominal aorta of a dog; Haidenhain (1894) sutured a one cm. opening in the axillary artery of a woman, the injury having been accidentally inflicted during the extirpation of carcinomatous glands; Abbe (1894) experimented with sterilized glass tubes in the bloodvessels, with the intention of uniting them and reestablishing the circulation; Manteuffel (1895) in operating for an arteriovenous aneurism in Scarpa's triangle wounded the common femoral, which he successfully closed by applying lateral sutures; Sabanyeff (1896) successfully sutured a small opening in the femoral artery.

The greatest impetus was given vasal surgery by the painstaking experimental and clinical work of Payr, Murphy, Pasha (1897), Dorfler (1899), Kummell (1900), and many other observers, all of which is familiar to present-day surgeons. After having been successful with his method of anastomosis by invagination, Murphy (1897) concluded: (a) that perfect technic and rigid asepsis are essential to success in vessel suture, (b) that the greatest gentleness should be practiced, (c) that hemostasis must be complete, (d) that fine silk sutures should be used, being careful not to penetrate the intima. On the other hand, Dorfler (1899) encountered no ill-effects from including the intima, *i. e.*, penetrating all the vascular coats with the suture, and he published a résumé of twenty-six experiments; sixteen were arterial wounds, with twelve successful results; the arteries were completely divided in four.

Schede (1882) was the first to successfully suture a wound in the vein of a human being. Not long thereafter his operation was duplicated by Billroth, Braun, Schmidt, and many other surgeons. Murphy (1897) sutured several wounded veins, one involving the common jugular. Since then surgery of the veins has rapidly progressed toward the acme of perfection until to-day it represents one of the most satisfactory surgical procedures.

Carrel (1902), after duly considering the experimental and clinical work performed by the methods of Payr, Murphy and others, devised and published his technic of circular suture. While his method differed from some of those previously suggested only in minor technical details, his work contributed more than that of any other investigator toward placing vasal surgery upon the firm foundation which now obtains. In brief his meth-

od (1902) was substantially as follows: (a) the injured vessels are exposed by a large incision and freely dissected from surrounding attachments, the external sheath being removed; (b) hemostasis is maintained by pressure of elastic bands made tense by clamps applied at the side; Crile's clamp is used upon large vessels; (c) the clot is most scrupulously "washed away" prior to suture; (d) absolute asepsis is maintained throughout the operation; (e) exceedingly fine, round needles are employed, the sutures being of white Chinese silk and the background black; (f) sterile vaseline is freely used upon the sutures and both within and without the bloodvessels; (g) through-and-through sutures are placed a short distance apart;* (h) the needles are left on these, an assistant holding one, the operator holding the single thread of the other in his left hand, and sewing toward the assistant; as each section is completed the suture is tied to the succeeding traction line, and then continued.

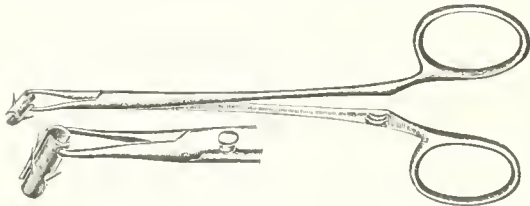


Fig. 1. Cannula-forceps for bloodvessel anastomosis; note the barbs.

Shortly after the publication of Carrel's technic (1902) Matas reviewed the entire subject of vascular surgery, and, under the heading of angiorrhaphy, classified the various procedures as follows:

(A) Arteriorrhaphy: (1) Lateral closure, (a) with aids (obsolete), (b) without aids, avoiding intima, or perforating all coats: (2) End-to-end closure: (a) by suture, direct marginal suture without invagination (Carrel); confrontation of everted intima with U-sutures (Jahoulay); through-and-through interrupted sutures (Salomoni, et al.); invagination (Murphy, et al.): (b) with extra-vascular aids, ivory clamps, decalcified bone rings, ivory cylinders, grafted section of vein or artery, rubber sheaths, horn clamps, aluminum rings, magnesium rings (Payr): (c) with endo-vascular aids, caramel cylinders (Carrel), glass cylinders (Abbe).

(B) Phleborrhaphy: (1) Lateral: (2) Circular: (a) with suture, (b) with aids.

In his experimental and clinical work on arterial anastomosis and transfusion, Ottenberg mentions that arterial anastomosis was made with small grooved rings, through which one end of the artery

was pulled and a cuff "turned back" to expose the endothelium; over this the other end was pulled so that the endothelium was approximated; this was then fixed with two silver wire bands. The method was highly satisfactory and easily performed. In two clinical cases reported, transfusion was perfect and from a technical standpoint successful.

Horsley has devised a clamp for lateral anastomosis of bloodvessels; it is five inches in length with delicate curved blades, the handles being on an axis with an imaginary line drawn from tip to heel, thus permitting the handles to lie flat and out of the way during suturing. In lateral anastomosis the vessels are clamped and held together by two sutures near the proposed anastomotic opening; the vessels are incised with scissors, a tractor suture

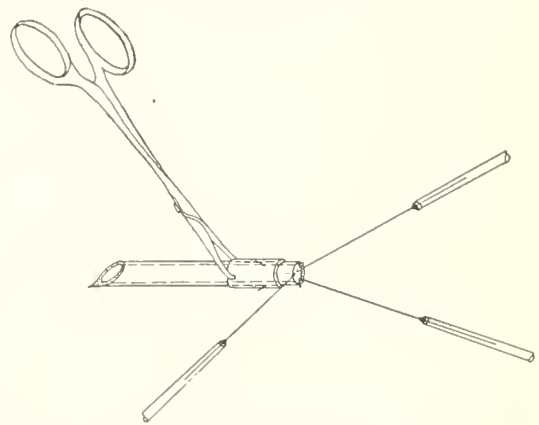


Fig. 2. Cannula opened and closed to include vessel; three iris hooks inserted.

being placed in the outer wall of each, but not tied; the suturing is accomplished with a curved needle, the knot being on the outside; a continuous overhand stitch is used; the tractor suture everts the intima and makes suturing easier.

According to O'Day, two important principles must be observed to successfully suture bloodvessels: (a) perfect apposition of serosa to serosa, and (b) that no trauma be inflicted upon that part of the vessel surface which is to come into contact with the blood stream. While the methods of Payr, Carrel and Murphy do not neglect these principles, a simpler procedure is described by this author, viz., the stumps are freed and all debris removed with normal saline solution; rubber-covered Crile clamps are applied to either stump, and if filling and pulsation occur just back of the proximal clamp, the operation may be begun; keep the field moistened with saline solution; the suture may be chromicized twenty-day catgut or Pagenstecher linen, size No. 00 to No. 1, depending upon the vessel. Four even lengths of suture are cut, one being held by the as-

* Whereas Carrel (1902) advised avoidance of the intima, he has later shown that it may be penetrated with impunity, thrombosis having no direct relationship to its puncture. This view is also held by many other experienced operators.

sistant; one of the others is tied to it in the exact middle, and the other two at distances representing one-fourth the vessel circumference; the assistant now passes his suture (to which the three are tied) around the proximal stump at sufficient distance from its end to insure the "turning back" of a cuff adequate to good serous apposition, and makes it secure by lightly constricting the vessel wall. The cuff is now turned backward and fixed by fan-shaped sutures with a needle on the free ends; the distal stump is then made to receive the cuff after the method of Payr, and a running stitch is carried around attaching the distal stump to the cuff margin; if the vessel be large a circular tie may give extra enforcement, otherwise this completes the work. The distal clamp is removed first, and the proximal clamp is then gradually released; the sheath is sutured over the reunited vessel.

Da Cunha believes that in arterial suturing by the Carrel method, the great difficulty lies in separating the arterial walls and in arranging the buttonhole for the arteries into a true triangle. To overcome this he advises the following technic: His apparatus consists of a pliable steel triangle 2 cm. in length and 5 mm. in width; at the center of each side of the triangle is a metal arm 2 cm. in length, at the end of which there is a small hook; the triangle can be opened at one side to permit its removal after the operation; the arterial wall is attached to these hooks at three equally distant points; by this method the round arterial opening is made triangular and the continuous suture may be introduced according to the technic of Carrel, after which the instrument is removed by opening the triangle. In lateral anastomosis, the two corresponding points on each vessel are placed upon two of the hooks only; the upper side is stitched first, and then after turning the instrument over, the suture is continued on the opposite side.

Lespinasse and Eisenstaedt describe the technic of applying their perforated magnesium rings in end-to-end and lateral vasal anastomosis. The time of absorption of the magnesium varies according to the quantity to be dissolved, the average being sixty to one hundred days. The size of the rings to be used will naturally depend upon the diameter of the vessel lumen; the rings are placed upon the severed ends, and the cuffs are then united thereto by several sutures. As a final step the distal and proximal ends are approximated by mattress sutures extending through the perforated rings and also the everted vessel walls. In making lateral anastomosis elliptical rings are preferred, the

technic being practically the same. Perforated magnesium plates are employed in repairing lateral injuries to the bloodvessels. Superiority is claimed for this method because the sutures and rings are extravascular and do not come into contact with the blood stream; the intima is not traumatized to any appreciable extent, hemorrhage and thrombosis being thus avoided; subsequent stricture has not occurred in any of their operations.

Carrel claims that his technic of vascular anastomosis can be regarded as complete. The chief sources of failure after vascular suture are stenosis, hemorrhage and thrombosis. Rigid asepsis is absolutely essential. The vessels are cleansed with a Gentile syringe, using Ringer's solution. Perforating stitches are always employed, and the endothelium is necessarily wounded, but trauma is minimized by using small, sharp, round needles. The sutures are sterilized in vaseline, and kept coated therewith during insertion. "Vaseline is rubbed off in the holes, covers the silk threads, and prevents the wounded tissue and the foreign material from coming into actual contact" (Carrel). His technic is applicable to any variety of anastomosis, including (a) the termino-terminal, (b) the termino-lateral, and (c) the latero-lateral. He concludes that his simple method of anastomosing bloodvessels can be safely employed upon the human being, provided the rules of technic be strictly followed.

The present day technic of vasal anastomosis as practiced by the majority of surgeons, where mechanical aids are not employed, is substantially the same as devised several years ago by Stich and later emphasized by Carrel and many others, viz.:

- (1) The isolation of six to ten cm. of the vessel; it is unnecessary to remove all the peri-adventitial tissue.
- (2) The application of proper clamps.
- (3) The severing of the vessel transversely, and resection of a portion where required.
- (4) Removal from the vessel ends of any remaining particles of peri-adventitial tissue; removal of any blood remaining between the clamps.
- (5) The placing and tying of three traction threads, everting the edges so that endothelial surfaces come into contact; completion of the anastomosis by continuous suture passing through the entire thickness of the vessel wall from within outward.
- (6) The removal of clamps: hemorrhage through stitch holes as a rule is controlled in three to five minutes by compression.

To facilitate the placing of sutures, nearly all

operators insist upon the necessity of introducing at least three traction threads into the cut edges of the vessel at equidistant points; by traction upon these the curved edges of the vessel are made straight, *i. e.*, becoming an equilateral triangle instead of a circle; into these straight and firmly held edges the sutures are much more readily introduced than into the curved and loose edges without such fixation.

My first enthusiasm in regard to vasal surgery dates from 1908, at which time I did considerable experimental work in relation to shock and hemorrhage in dogs. A great many transfusions were performed, using a glass tube coated with paraffine for a canula.

The principal objection found to the technic described by Stich, Carrel, et al., is that it entails the introduction of traction or stay sutures. After considerable experimentation I devised in 1912 a

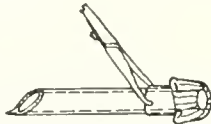


Fig. 3. End of vessel "cuffed" and held on the three barbs.

canula-forceps for vasal anastomosis and transfusion, which I have since employed with great satisfaction. The instrument was exhibited before the Mississippi Valley Medical Association in Chicago in the latter part of 1912, and a short description without illustrations appeared in the *Cincinnati Lancet-Clinic*, January 25, 1913.

The instrument was devised: (a) to obviate the necessity of the troublesome stay sutures described in the Carrel technic, (b) to accurately approximate the endothelial surfaces of the two vessels to be anastomosed, (c) to prevent constricting the vessels at the suture line, (d) to obviate the necessity for a skilled assistant in vasal surgery, (e) to shorten the time of these procedures. These were found the chief difficulties in execution of the Carrel technic. In all other respects the technic employed is identical with that advocated by Carrel and others.

The instrument is made in several sizes, so that the canula will have a caliber of $1\frac{1}{2}$ mm., 2 mm., 3 mm., or larger if desired. The canula portion is slightly spooled at one extremity. This canula-forceps may be successfully used in making a temporary anastomosis between two bloodvessels, for transfusion or for making a permanent end-to-end or end-to-side anastomosis.

I have recently made a slight improvement in the construction of the canula-forceps. This con-

sists in the addition of three barbs placed equidistantly around the circumference of the canula. It is believed this constitutes a decided advantage over the old pattern, the reasons for which are obvious. The illustrations presented herewith more fully explain the device. The barbs mentioned may be readily seen in one of the cuts. The instrument is to be used as follows after the vessels have been prepared:

(1) The canula is opened and then closed to include one vessel about 3 to 4 mm. from its cut end; the end of the vessel is then caught by three iris hooks from within and "cuffed over" the spooled portion of the canula and held on the three barbs.

(2) The end of the second vessel is now caught from within by three iris hooks and pulled over

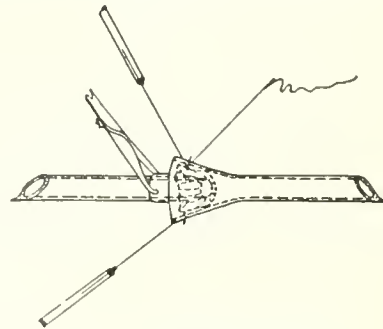


Fig. 4. End of second vessel pulled over everted vessel and fastened on barbs ready for suture.

the everted vessel on the end of the canula, and fastened on the barbs; thus the endothelial surface of one vessel is brought next to the endothelial surface of the other.

(3) A continuous suture is inserted through all the coats of both vessels 2 mm. from their approximated ends.

(4) The ends of the bloodvessels are removed from the barbs.

(5) The canula is then slipped out of the cuff (away from the line of sutures), opened, and removed.

(6) The Crile clamp on the vessel distal to the anastomosis is removed first, then the proximal clamp is removed, which allows the blood to flow; additional sutures are inserted to control any oozing.

For end-to-side anastomosis, the smaller vessel is everted over the spool of the canula and fastened on the barbs as in the first instance, and inserted inside of an incision in the larger vessel. The iris hooks are caught into the edges of the incision in order to pull the larger vessel over the everted vessel on the end of the canula, and it in turn is caught on the barbs. Again we have endothelial surface next to endothelial surface. The continuous suture

is used as before, after which the instrument is removed.

In the performance of transfusion the blood vessels are "cuffed over" the end of the canula, as in the case of an end-to-end anastomosis, and a single suture is tied around the cuffs of the vessels on the canula. It is unnecessary to suture the vessels.

I have found it so easy to make an end-to-end anastomosis by using this instrument, and the blood flows so much more freely after the vessels have been sutured than in the case with any other sort of canula, that end-to-end suture anastomosis is advised in all cases where it is desired to perform transfusion. The time of the operation is from four to ten minutes.

The instrument may also be used for ureteral anastomosis, where the ureter has been severed accidentally or otherwise.

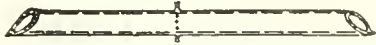


Fig. 5. Longitudinal section of sutured vessels showing endothelium next to endothelium.

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TUBERCULOSIS OF THE BLADDER VS. ADENOMA.

Tuberculosis of the bladder may be confused with adenoma. Imagine a tubercular process attacking the trigone and dissecting under the mucous membrane, freeing it and allowing it to flap against the internal meatus like a tumor would. In diagnosing this condition we have the history of the cases, the age of the patient, tuberculosis occurring in younger men, and intense pain. Since primary tuberculosis of the bladder is rarely if ever seen, the location of the primary focus is elsewhere in the urogenital tract. Tubercle bacilli may sometimes be found in the urine. The cystoscopic findings complete the diagnosis.—WILLIAM S. EHRICH, in the *Lancet-Clinic*.

PRELIMINARY CONSIDERATIONS OF DRUG ADDICTION IN SURGICAL CASES.

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It has been my experience in conversation with my surgical fellows that many of them have regarded addiction to a narcotic drug as something that did not concern them, and in which they had little or no interest. If the surgeon is to be regarded as an artisan, a skilled repairer of mechanical defects in the human machine, whose only responsibility is that of handiwork in the operating room, this attitude toward drug addiction may be a reasonable one. If, however, the surgeon is a man into whose hands passes for a time the whole care of a human being, anything which influences the recovery or the well-being of his patients should command his attention and consideration.

In its attitude towards drug addiction the medical profession as a whole has for a long time regarded the fact of continued drug use, and the amount of drug used as considerations of such paramount importance, that it has paid insufficient attention and has given inadequate study to the actions of a drug of addiction upon the person or individual, and to the influences of the physical addiction mechanism in the healing and repair of other conditions. And yet many a surgical case has terminated unsatisfactorily simply and solely because of the surgeon's failure to grasp the importance of, and his inability to understandingly deal with, the intercurrently existing condition of addiction to a narcotic drug.

The general consideration of treatment and care of addiction cases has been too much centered upon and arranged about the mere fact of use of the drug of addiction. The treatment and care of addiction has been too much confined to efforts directed toward the mere withdrawing of the drug of addiction. The surgeon is not to be blamed if in his attitude toward the addict he simply reflects the preponderance of medical expression and the weight of medical authority. The actions of the drug of addiction upon an addict, and the reactions of an addict to the drug are matters that have received but scant attention from the medical profession as compared with attempts at reduction of dose or withdrawal of drug. And yet the amount of

drug used, within certain limits, is not at all a gauge as to the extent of addiction, nor is it a measure of the influence of addiction upon the functional and organic processes of a person addicted.

A rather common belief among operating men is that an addict to narcotic drug is a difficult case for surgical handling and is a poor surgical risk. I have many times known surgeons to refuse to operate upon a narcotic addict until that patient should stop the use of the drug. That the narcotic addict has borne this undeserved reputation as a poor surgical risk and that this reputation has been seemingly merited by previous experience is not to be laid at the door of the existence of addiction in him. It is to be laid at the door of insufficient medical comprehension of addiction disease mechanism in its material manifestation, and in its functional and organic influences, and at the door of inadequate clinical study into the analysis, estimation and control of these factors. Like very much else that has been for generations generally accepted as true about narcotic drug addiction, the belief is erroneous that the addict is a poor surgical risk because he is an addict. In very many cases,—and this holds true especially in opiate addiction—the addict, if his addiction mechanism is competently appreciated and its influences wisely controlled, is quite other than a bad risk. Indeed the presence of addiction can very often be handled in such a way as to make it an asset rather than a liability. It has been my frequent experience to be called in consultation upon post-operative cases whose lack of repair and slowness of recovery was due simply and solely to the lack of comprehension of, or to inadequate control of addiction mechanism existing in the patient. The intelligent addict who is about to undergo operation very often, if not as a rule, himself provides for possible contingencies by the concealment of, or by outside provision for, a supply of the drug sufficient in amount to meet possible emergencies. There are very many addicts who have out of their past experience and study upon themselves competently controlled their own narcotic drug disease during treatment for other conditions, operative or otherwise. The number of narcotic addicts is not few who have been cared for medically or have undergone operations for the remedy of various medical and surgical conditions, have recovered, convalesced and been discharged without the physician or surgeon becoming aware that his patient was addicted. This is not a comment of a special bearing upon the surgical branch of our profession. It is equally true in medical practice. It seems strange that a condition

of as powerful influence over body function and metabolism as is exerted by the addiction mechanism of narcotic drug disease should not long ago have received exhaustive and complete medical study along the lines of its manifestations and influences, as well as along the line of reduction and deprivation of the drug of addiction.

It is to my mind of vastly more importance at the present time that the mass of practitioners of surgery as well as the mass of practitioners of medicine should understand and be able to control action and reaction in a narcotic addict as a result of his addiction mechanism, than it is that they should attempt the mere withdrawing for the routine reduction of the drug of addiction. The complete and successful withdrawing of a drug of addiction is a matter of comparatively easy and assured accomplishment in the hands of a man who has learned to recognize, appreciate, measure and control, the elements which constitute and complicate addiction. It is, however, a matter of extreme difficulty and comparatively rare success in the hands of a man who does not understand these elements, and who cannot with clinical comprehension and intelligent understanding of addiction mechanism conduct a case of narcotic drug disease.

The actual withdrawing of a drug of addiction from a narcotic addict is merely one stage, and it is not by any means the most important stage in the rational consideration and handling of a case of narcotic drug addiction. The mere fact that a patient is using a narcotic drug and that he uses within reasonable limits a larger or smaller amount of that drug, is a matter very minor in immediate importance as compared with his general functional, nutritional and metabolic efficiency. This is true as a general proposition in the handling of any case of narcotic drug addiction, and it is vastly more true in the handling of cases of other conditions or diseases, operative or otherwise, that are complicated by narcotic drug addiction. The physician or surgeon should realize that the use of a narcotic drug by a patient under his care is of very little importance compared with the satisfactory recovery of his patient from the condition for which he is treating him. The physician or the surgeon who has in his care a narcotic drug addict whom he is treating for another disease condition should remember that the patient's recovery from the condition for which he is being treated depends to a great extent upon the amount of functional balance and organic and metabolic adequacy which exists in that patient, and he should realize that functional balance and organic and metabolic adequacy in a

narcotic addict are largely under the control of, and vary with, the extent to which that patient is kept in adequate narcotic drug balance.

The establishing and maintaining of adequate drug balance therefore is one of the most important elements to be considered in the conduct of a case of narcotic addiction undergoing operation or treatment for a condition other than the cure of his addiction. In handling such a patient the physician or surgeon should completely put out of his mind any idea of at the same time relieving or curing the addiction with which his patient is afflicted. I have repeatedly heard of many, and have personally come into contact with, cases of narcotic drug addiction where the physician or surgeon was trying to reduce or withdraw narcotic drug as a desirable incidental in the course of treatment for other disease conditions. I appreciate that there are cases of addiction in which this may be successfully accomplished. I know, however, that in the majority of cases it is too harmful a procedure to be anything but condemned. Not only will the surgeon or physician almost invariably fail in his attempt at remedying the narcotic addiction, but he very severely handicaps his other work on that patient, and very seriously jeopardizes the main issue toward which efforts are directed.

The successful cure of a case of narcotic addiction is in itself a problem sufficiently important to deserve undivided attention from the man who is treating it. *The reduction of a drug of addiction below the amount of body need robs the addict of his most valuable asset in securing and maintaining recuperative powers.* I have gone into this more fully elsewhere and shall discuss it more at length in succeeding papers. I shall not therefore take up time for it in this preliminary discussion.

The relief and cure of narcotic drug addiction is not a matter to be lightly undertaken as incidental to the conduct of other conditions. In the treatment of narcotic addiction, as I have written elsewhere, success depends far more upon nutrition, and upon the nervous, functional, organic and metabolic adequacy and balance of the patient at the time of withdrawal of the drug than it does upon the special methods used for the accomplishment of withdrawal, or the amount of drug which is daily needed to supply body demand. It is practically as hard to withdraw narcotic drug from an addict whose body need is one-half a grain a day as it is from one whose need is five grains a day. Attempts at mere reduction in dose are not worth what they cost in nervous strain, suffering and physical inadequacy. The withdrawal of drug from a narcotic addict is practically never a matter of

immediate and urgent therapeutic indication. Indeed it might be said that in a vast majority of narcotic addicts attempts at immediate withdrawing, or reduction below the point of body need, are most decidedly contraindicated.

In answer to a recent letter from the Henry Ford Hospital, of Detroit, stating that the method known as the "Townes' treatment" had proven unsatisfactory and unsuccessful in their hands, and asking for my advice as to further procedure, I wrote as follows:

"One of the greatest oversights and neglects has been the almost total ignoring of the many other considerations and conditions to be met in drug cases, and the wide variation in clinical picture and disease manifestation to be met in individual cases. One case can be cleared of his addiction in a few days; another will require much longer. Different stages of the disease will require different handling. Different individuals present different problems in physical reaction and in physical resistance. To my mind and in my experience it is of vastly more importance to so measure and control and treat a patient as to get him into the fittest possible condition for final withdrawal, than it is to have a knowledge of any one method of withdrawal. Drug withdrawal to my mind is very much like an operation of election—to be done when the patient is ready for it and by whatever procedure is indicated when the proper time arrives. The getting of the patient ready for it determines, just as it does in the operation of election, to a great measure, the success of the work and the freedom from complications and sequelae."

Since the final withdrawal of drug is to be regarded as comparable to an operation of election, and the time of its execution is a matter of arrangement and of preceding preparation, it is obvious that it should not be undertaken with expectation of satisfactory issue in the course of treatment for an ailment which demands and expends recuperative powers. Recuperative forces should be maintained and directed toward whatever is the need of paramount importance at any given time. In the conduct of a surgical case the indication of paramount importance is recovery from the condition for which the patient applied to the surgeon. All other conditions present should be handled in such a way as to interfere as little as possible with the successful accomplishment of the main issue. The proper control of narcotic addiction mechanism, and of its influences upon a patient addicted, is the important problem presented by narcotic addiction as met in the field of surgical work.

151 WEST 85TH STREET.

REVIEW OF FRACTURES TO DATE.

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It is assumed for the sake of brevity, and in order at once to get at the gist of the discussion that your Secretary is asking me to write on "Review of Fractures to Date," intended that I should take up the "fifteen or twenty minutes" allotted to this paper in a general review of the late methods of treating fractures.

I beg you to note, therefore, that the paper will have to do only with a review of the general principles of the treatment of fractures of the long bones.

As much of this paper may appear dogmatic, I wish to say at once that most of its statements and conclusions are based on the study made by the Committee on Fractures of the American Surgical Association and on the report of this committee (all of which has not yet been published).

To the Etiology, the mechanical principles involved and the classification of fractures very little of importance has been added of late. It would profit us very little to go into this preliminary investigation.

The study of a large number of reports from some of the best and most experienced surgeons shows there are five points of great importance to be considered in establishing the proper treatment for every case of fracture of a bone of the human body.

1st—The particular individuality and surroundings of each case.

2d—The age period of the patient.

3d—The time after the injury the permanent dressing or the restitution of the fragments is accomplished.

4th—Proper alignment of the limb and good anatomical reduction of the fracture.

5th—The method of fixation and the proper apparatus, splints or dressing necessary to maintain the fragments in proper position without serious injury to the soft parts and with the least discomfort to the patient.

First—The individuality, etc., of the patient. This point is so obvious and I have so often called attention to it that before this audience it is not necessary to do more than to recall it to your attention.

Second—The age period: A study of 1,745 cases of end results of fractures of the long bones indicates that the age period 1-15 years shows an inherent tendency to recover from fractures with

good functional results, though anatomical adjustment of the fragments may not have been good. The asymmetry produced by angulation is soon overcome by adjustment of the other members of the skeleton. Overlapping of fragments with resulting local bulge rounds off and in process of time disappears unless the fragments have been allowed to unite in an unpardonably bad position (and the alignment is bad).

As the age periods advance it becomes more and more necessary to obtain good anatomical adjustment of the fragments in order to assure good functional results.

Third—The sooner the adjustment or setting is done after the injury the better and quicker the recovery.

Reparative processes begin early, much earlier than surgeons have hitherto seemed to think. If setting the fracture is delayed what already has been done by natural processes will be destroyed and the second attempt to do the osteocementation will not be as quick nor as energetic.

Fourth—Anatomical, or accurate, adjustment of the fragments, other things being equal, always result in shorter disability and better function. This, however, is not always true when the open method is employed to secure accurate adjustment. Many cases of plating, with anatomical adjustments, take longer periods for recovery than do less accurately replaced fragments treated by the closed method. Except in children, however, the function is better in the accurately adjusted cases.

Fifth—The method of fixation and the dressing of fractures, while most important, is to-day perhaps more varied and various than ever they were. From the great mass of material and methods it is impossible to cull any special one to recommend. None of them are applicable to every case, even to the fracture for which it was originally advised.

A surgeon of a mechanical turn of mind and training, if he has the necessary anatomical knowledge, usually can adopt a proper dressing and fixation for his cases of fracture and he will be able to vary them as the individual case requires.

There are certain general principles, however, which should be kept in mind by every surgeon and should be sedulously practiced by the average practitioner.

- (a) If the surgeon be a practitioner not accustomed to treating fractures, he should always consult an experienced man before doing anything.
- (b) Never attempt to set a fracture unless there is at hand splints or apparatus to retain the

fragments in place. It is unnecessary and it is brutal to subject a patient to the suffering produced by the necessary manipulations for temporary adjustments. The extremity should be fixed so that the ends of the fragments will do no further injury, or occasion any unnecessary pain, and nothing else be done until the permanent dressing may be applied.

- (c) If the patient's condition will permit, a general anesthetic should always be used in setting a fracture.
- (d) Always try to obtain good alignment, even though anatomical restitution is not practicable.

Proper apparatus after reduction, as was said before, must be adapted to each individual case. In my own clinic I find that plaster of paris moulded splints, put on during general anesthesia just as soon after the injury as possible, is the method of dressing usually employed.

The position of the limb as regards flexion, extension, abduction and adduction is maintained according to the indication of the case. When steady traction is necessary for reducing the fracture and maintaining it during the application of the splints a Lemon Extension Apparatus has been found exceedingly useful and efficient. Bardenheuer extension and counter extensions at various angles and in several directions are very irksome and trying for the patient, and they are seldom used in this country. For traction in difficult cases for continuous extension the Steinmann nail method is sometimes useful. Dr. John Gerster has employed this method very satisfactorily in a number of cases.

The old Buck's Extension method or some modification of this method is still the favorite method for continuous traction. Too little weight is used as a rule in Buck's Extension. Analysis of reports of about 1,000 cases of fracture of the femur shows the average weight employed has been less than 10 pounds. Manifestly this is absurdly too little. "The gauge of the proper weight required is that necessary to overcome the shortening."

Daily measurements should be taken and weight be added or taken away according to whether the limb shows shortening or elongation as compared with its fellow.

Rigid board or metal splints are rarely applicable for permanent dressings. They cannot be adapted to limbs without causing pain from irregular pressure, (except perhaps the Thomas Splint, of which Jones speaks so highly); extension with

them is very uncertain and difficult to maintain. The forearm perhaps is a region which is an exception to this rule.

Championniere method of treating fractures by massage carries with it many suggestions of great value, though it has not been at all generally employed in this country. The principle of keeping up the nutrition of the muscles and encouraging an active circulation of the injured part is certainly one to be recommended. The massage should, however, be begun after the spasmodic stages are passed. Then the fixed dressing may temporarily be removed, the limb be massaged and the dressing reapplied. This should be repeated every few days. This massage shortens the period of weakness, prevents atrophy of the muscles, and promotes bony union.

The question of operative or non-operative treatment must be determined by each surgeon in every individual case. Operative treatment requires skill and thorough aseptic technic and surroundings. It should not be attempted by a novice.

As was said children under 15 years of age do not require operative treatment of fractures as a rule.

The Committee on Fractures of the American Surgical Association collected 1,745 cases of fractures, the end results of which were ascertained and the patients examined. Of these 1,358 cases were non-operative and 387 were operative cases. 258 cases of simple fracture were operated, and 129 cases of compound fracture were operated. A little over 25 per cent. of the cases were operated.

I find that of 97 major fractures of long bones treated in St. Luke's Hospital last year, we operated on 35, about 37 per cent.

The Committee of the American Surgical Association found that the anatomical recoveries were better in the operated cases, but that the percentage of functional recoveries were higher in the non-operated. In my own cases the function and anatomical recoveries were higher in the operated cases.

There are certain regions which fractures are particularly difficult to treat successfully without operation.

A. In the Upper Extremity: (1) Fractures about the anatomical neck of the humerus. These fractures as a rule require an open operation for proper adjustment.

2. Fractures about the condyles of the humerus are also trying ones to treat. Since Jones of Liverpool has taught us the value of fixation of the forearm in extreme flexion and the very general ap-

plicability of this method for most of the fractures of the lower end of the humerus, these fractures may be regarded with less apprehension than they formerly were.

3. Fracture of the bones of the forearm anywhere below the end of the tuberosity of the radius to the middle of the lower third of the bones are exceedingly difficult ones to adjust. Personally I find fractures in this region in many cases absolutely irreducible without an open operation.

B. *Lower Extremity.* 1. Fractures of the neck of the femur within the capsular ligament. Royal Whitman gave us the key to this treatment when he showed the importance of abduction in treating these cases. John Murphy contends that it is absolutely necessary to have the distal and proximal fragments in apposition at their fragmented surfaces in order that the osteogenesis may extend from the shaft fragment to the head fragment. He thinks the head fragment has no osteogenetic qualities at all and will atrophy if not so apposed. Therefore, he recommends an open operation and nailing the fragments together. In my own practice a Nathan Smith's anterior wire splint, or perhaps better still a Hodgen's wire apparatus to support the extremity while it is swung outwards in abduction by proper placing of the overhead beam from which the extremity is swung, has proved especially efficient and agreeable to the patient.

2. Fractures of the upper third of the femur. These are always very difficult fractures to treat. Fractures in this region especially lend themselves to the open method of treatment. Direct fixation by means of a plate seems much the best way to meet the ever present tendency to elevation and external rotation of the upper fragment. Besides, this region of the bone is much nearer the surface than those lower down, so the wound required will not be so deep, nor otherwise as extensive as that which is required lower down.

3. Fractures of the lower third (super condylar fractures), with posterior displacement of the distal fragment into the upper popliteal space sometimes prove very intractable fractures to reduce. If one fails to reduce the fracture under general anesthesia an open operation should be done at once, for the pressure of the distal fragment on the vessels is apt to result in thrombosis and possible loss of the leg. For this fracture Jones of Liverpool especially recommends the Thomas Extension Splint.

4. Fractures of the tibia below the level of the tuberosity, if the fractures are spiral or very oblique, are exceedingly difficult to retain in position, *if reduced*. Reduction sometimes is also practically

impossible without an open operation. This is true also, but in a lesser degree, of fractures of both bones of the leg. This region, on account of the prominence of the tibia, is especially apt to be observed by the patient and friends. A lack of proper apposition, with a local projection of bone and angulation, and the resulting distortion is very objectionable. Hence open operations should be employed when careful attempt under anesthesia to reduce and hold the fragments has failed.

5. Pott's fracture, viz., fracture of the fibula in the lower third with a fracture at the lower part of the internal malleolus, or tearing away of the internal lateral ligaments, and always a luxation of the ankle joint, is also a difficult fracture to treat. The important feature of this fracture is the proper reduction of the dislocation. When the lower end of the proximal fragment gets behind or between the tendons nothing short of direct vision will assure proper reduction. This can only be accomplished by an open operation.

The up-to-date treatment of fracture of the long bones therefore resolves itself into the two general methods.

1. The conservative, non-operative.
2. The open or operative method.

In this country the non-operative method still has by far the largest number of adherents.

A study of the reports of a large number of cases and persistent inquiry indicates that though numerically in the minority, the surgeons who especially favor operative treatment of fractures are those who have a very large clientele of fracture cases, and who have especial opportunities and facilities for noting and observing the end results of fractures. Fractures of the femur, concerning which the statistics and reports are especially full and accurate, are those particularly recommended for the open method of treatment.

It is obvious that the treatment of fractures still requires a great deal of study.

I would urge the simplification of methods and the standardizing of results.

The mechanical devices for the treatment of fractures are entirely too many and too complex. The simpler the method usually the better it is. For this reason careful reduction under general anesthesia and the application of a plaster of paris splint appeals to me. The fragments should be kept in place by strong mechanical unvarying traction (as by a Lemon or Lambotte traction apparatus) while the plaster splint is applied.

The Workmen's Compensation Laws, now so general in the United States, will undoubtedly operate towards the better record, better study and

better treatment of fractures. This will lead to the establishment of the average period of disability of fractures in the several regions of the extremities. Standard treatment and standard results will unquestionably follow. Surgeons will be obliged to pay more attention to traumatic surgery in the near future, and men who are qualified and who are willing to do so will be made teachers of traumatic surgery in the medical colleges.

The Fracture Committee of the American Surgical Association is endeavoring to collect a large number of well recorded, well treated and well observed cases of fractures in order to standardize fractures.

Apropos of this matter, and of very great importance are the last "Recommendations" of this Committee on Fractures. I beg your earnest attention to these and hope you will at once adopt the last one of these recommendations.

"Neither the non-operative nor the operative method is to be recommended exclusively. Each has its indication and should be employed when required. Generally speaking the age period under fifteen years is the period in which non-operative methods are especially effectual. In the other age periods up to 60 years, operative methods may with confidence be employed when non-operative treatment has proved ineffectual in reducing, or controlling the fragments in proper position. The operation should not be delayed longer than one week after the injury.

"The open method when adopted should be employed early. It may be used at any age period except in senile cases whenever a skiagram shows a deformity or a position of the fragments which obviously cannot be reduced or when proper efforts at reduction and retention have proved unavailing.

"Some form of rigid plate applied directly to the bone or an Albee 'inlay' seems to be the best fixation method in operative cases.

"Open operations for simple fractures should be undertaken only by experienced surgeons who are thoroughly equipped by training and who have proper instruments and apparatus to meet all the possible indications of the operation.

"The work of this Committee has been greatly hampered by the inadequacy of the records submitted for its consideration. A large proportion of the cases had to be rejected entirely and most of them were so incomplete as to make deductions based upon them possibly misleading.

"The first step in the betterment of practice is the study of results achieved by present day methods. An adequate study is impossible without adequate records.

"The Committee strongly urges the American Surgical Association to set its seal of approval upon the standard form of record submitted by the Committee, and to further petition the American Medical Association to do the same. The Committee also urges each member of this Association faithfully to keep these records in his practice and to see that they are kept in the hospitals to which he is attached.

"The Committee further recommends that a copy of the approved form be sent to all corporations within the United States of sufficient importance to have their own relief organizations or medical service or both; to all accident insurance companies to be embodied and incorporated in the papers given to the insured, with the requirement that they be filled out at the time of an accident involving fracture; to all hospital boards with the request that these records be made a part of the routine records of fracture patients, pointing out that thus not only are the hospital and its surgeons protected in case of litigation, but that most valuable material is being collected to serve for attaining better results in the treatment of fractures."

UNLOCALIZED INTRACRANIAL INJURIES.

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There is no satisfactory classification of intracranial injuries. One thing is certain and that is that such injuries should not be looked at from the viewpoint of a skull fracture. Lockett and Stewart from their experience with the x-ray in the diagnosis of skull fractures state that they "have no hesitancy in saying that the majority of fractures of the skull are not diagnosed as such and remain undiscovered." The least important lesion in a fracture of the skull is the fracture itself. The important lesion is the injury to the brain and other cranial contents produced either by the trauma or by the resulting circulatory disturbance. And death is not due to the fracture itself but to the intracranial complications incident to the fracture. In skull injuries it is not necessary to have a fracture in order to produce intracranial complications and death. So all cases of skull injuries should not be looked at from the viewpoint of a skull fracture, but should be diagnosed and treated from the viewpoint of an intracranial injury, regardless of whether or not there is a fracture, but bearing in mind that a force sufficient to fracture the skull is more likely to result in an intracranial disturbance than a force not sufficient to fracture the skull.

Krause says that "all injuries of the skull, with or without an external wound, or complicated by fractures of the skull, may give rise to cerebral concussion, cerebral contusion, and cerebral compression. All of these three conditions may frequently appear together to a more or less marked extent." This classification would be a good one provided it was possible to differentiate the one from the other. The difficulty is that it is frequently impossible to diagnose either the nature or the extent of the injury. The symptoms of intracranial injuries merge into one another to such an extent that often the best we can do is to diagnose an intracranial injury. For practical purposes such a diagnosis is sufficient and we believe that all such injuries should be looked at from the viewpoint of intracranial pressure. It makes no difference whether or not this pressure is due to a contusion, a hemorrhage, or an edema, or whether or not there is a fracture. The important thing to arrive at is the amount of this pressure and the ability of the brain to withstand it. An injury to the brain, like an injury to any other part of the body, is followed by the process of reaction; namely, edema, a round cell infiltration, and if severe, an extravasation of blood. This process of reaction is a space restricting process, a compression, and it is not necessary to have a hemorrhage in order to produce it. Not much is known concerning the function of the cerebrospinal fluid, but, as emphasized recently by Frazier, it plays an important part in intracranial surgery. An increase in the amount of this fluid interferes with the circulation of the brain and produces the picture of intracranial pressure. So the cerebrospinal fluid must be reckoned with in the treatment of intracranial pressure following an intracranial injury.

The picture of intracranial pressure is not always clear cut. There are certain signs and symptoms which aid us in determining the presence of and the amount of this pressure, but there is no sign or symptom which is dependable. For this reason no element in making the diagnosis should be looked upon as unworthy of consideration and too great trust should not be placed in any one sign or symptom. In our experience a fairly reliable method of determining the presence and amount of intracranial pressure has been a lumbar puncture and we believe that this should be a routine procedure in every case of suspected intracranial injury. Not only will it give a good idea of the amount of pressure, but by relieving this pressure it will aid in the recovery. By the presence or absence of blood in the fluid it will also tell us

whether or not we have a subdural hemorrhage—an extradural hemorrhage will not give a bloody fluid.

From the viewpoint of treatment intracranial injuries may be divided into localized and unlocalized injuries. By a localized injury we mean one in which there is "external or neurologic evidence" of the location of the injury. In such an injury the indications for treatment are self-evident and need not be considered.

By an unlocalized injury we mean one in which there is no sign or symptom whereby one can definitely locate the injury and for this reason no special point of surgical approach. Fractures of the base of the skull often come under this classification, but such a fracture is not necessary and when present it is not the important lesion. The important lesion is increased intracranial pressure, and any injury sufficient to produce a circulatory disturbance and the resulting changes in intracranial pressure may come under the classification of unlocalized intracranial injuries.

It is in this class of intracranial injuries that we wish to suggest the more general use of the split muscle subtemporal decompression and drainage operation after the method of Cushing. The advantages of this approach are so well known that we will not take the time to review them and we will all agree that if surgical intervention is indicated in unlocalized injuries, Cushing's operation is the operation of choice. It then becomes a question as to whether or not surgical intervention is indicated. In discussing this question we must bear in mind that the skull is a closed box and does not provide for an increase in size; that trauma to the brain, like trauma to any other part of the body, is followed by the process of reaction and that this process is a space restricting process, and that this space restriction produces an interference with the circulation and that this tends to bring about an anemia of the vital centres and death. Treatment then must be directed towards a relief from pressure, and this operation accomplishes this in two ways, first, by draining away the cause of this space restriction, whether it be cerebrospinal fluid or blood; and, second, by the removal of a portion of bone from the temporal region allowing for a certain amount of expansion of the brain and "possible accommodation to a hidden clot." All this aids in bringing about absorption and a return of the circulation to normal. The operation is one for the open treatment of intracranial pressure and not one for the open treatment of fracture of the skull. The operation, however, is not

always indicated and should not be used as a routine. For instance, the injury itself may afford sufficient relief from pressure as is seen in basal fractures with a free discharge of cerebro-spinal fluid and blood from the ears, nose, or mouth. This often is so great as to cause one to wonder what chance the patient would have had if there had been no outlet for drainage and a basal drainage had not been done. Again, repeated lumbar punctures may afford sufficient relief from pressure, for the subarachnoid space of the brain is continuous with that of the cord. But if this fluid is bloody the results from lumbar punctures are not satisfactory and a basal drainage should be done. Again, because of the non-severity of the injury the brain can take care of its own process of reaction and repair.

An unlocalized intracranial injury is often associated with a fracture of the base of the skull and it is in this condition that a decompression with drainage is of special value. Statistics from large hospitals show that the mortality following basal fractures, without operation, is from 50 to 65 per cent. As to the mortality following such injuries where a basal drainage has been done no statistical conclusions of great value can be drawn because of the rather small number of results reported. In order to determine whether or not this operation is worthy of more general acceptance I believe it to be necessary to report the results obtained. Since January, 1909, I have performed the operation in thirty-three cases of unlocalized intracranial injuries, the majority of them cases of basal fractures, not, however, as a routine procedure but only in those cases where I felt that it was indicated to save life or to prevent future complications, and when in doubt the operation was performed. Nine of the thirty-three cases died, a mortality of 27 per cent. Taking the average mortality, following such injuries, without operation, at 50 per cent. this is a reduction in mortality of about 23 per cent.

The saving of life, however, is not the only consideration in the treatment of these cases, for we must use every effort to guard against the remote possibilities of the injury. Murphy, speaking of skull fractures, says, "the injuries with a compound or depressed fracture are the least injurious, that is, where the edge of a sharp instrument or bone penetrates the brain, if there is recovery from the immediate effects you rarely have any subsequent trouble. But the blows that produce unconsciousness, with or without fracture, never leave the patient free from the danger of a cerebral complication." Bloodgood in 1910 said "up to the pres-

ent time I have been unable to find any case of epilepsy following an injury to the skull in which some piece of the skull was removed either by operation or by the injury itself. This would substantiate the view that epilepsy is more apt to be started up by changes in pressure than by the actual injury." The above statements, notwithstanding the many exceptions, are surely arguments for a decompression drainage operation. In the conditions mentioned above there is a decompression and drainage performed by the injury itself, and if such a decompression and drainage does away with subsequent trouble then surely a subtemporal removal of bone and dura with drainage should give us the greatest assurance possible for a favorable ultimate outcome of the case. That the removal of dura mater in cases of intracranial injuries lessens the chances of headache, vertigo, loss of memory and epilepsy is the consensus of opinion in the profession to-day.

From our experience with this operation we have learned some points perhaps worthy of mention. One is that where there is a compound fracture of the vault with an uninjured dura and evidence of a subdural clot it is more advisable to open the dura and deal with the clot through a subtemporal opening than through an opening in the dura at the site of the injury. That if there is an associated middle meningeal hemorrhage this vessel can be ligated and the clot removed through the subtemporal opening in about 90 per cent. of the cases. We would suggest this approach as the one of choice in a middle meningeal hemorrhage. That there is no reliable guide as to which side of the skull will reveal the greater indication for opening. If the findings at operation on one side are not sufficient to account for the symptoms or if there is no improvement, the opposite side should also be opened. That the time of the operation is important. The sooner after the injury the operation is done the better the prognosis. A "decompression" without opening the dura is not a decompression and is of no use. A decompression alone is not sufficient and a basal drainage must also be done, and to insert the drain the base of the brain should be elevated—it is often not until this is done that the basal clots appear. Blair's experimental work showed that "an animal struck upon the vertex showed at autopsy a basal clot around the cisterna magna and the interpeduncular space and enveloping the pons and medulla. In animals struck in the same way but on which an immediate subtemporal drainage was done, such a clot was either absent at autopsy or at least was absent on the side that was drained."

I would like to cite a few typical cases of unlocalized intracranial injuries so as to show the symptoms, findings, and results that might be expected in such cases.

CASE I: J. M. Injured January 22, 1912, by being thrown from a rapidly moving train. Entered hospital deeply unconscious, stertorous breathing, vomiting, pupils dilated, relaxed muscles, blood pressure 112, pulse 120, temperature, on admission 101.7. Bleeding from both ears and vomited blood. Right subtemporal drainage done at once. Large extradural hemorrhage. Middle meningeal ligated and clot removed through the subtemporal approach. Dura dark and bulging, no pulsation, on opening dura several clots with bloody cerebro-spinal fluid rushed out. Brain elevated and cigarette drain placed in middle fossa. Returned to bed with pulse of 140 and blood pressure 90. Dressings soon soaked with blood and cerebro-spinal fluid. Next day blood pressure was 110, temperature 102.8. Second day temperature was 103.4 and he was partly conscious. Fifth day temperature was normal and right disc showed a receding edema. He gradually improved and on February 12th his fractured leg was plated and he left the hospital on May 8th. He was seen one year later—recovery had been complete.

I feel certain that the early operation saved this man's life. The case comes near to upsetting Phelps's conclusion from his 1,000 cases of head injuries, that no case with a primary temperature of 102 or more has ever recovered. The primary temperature here was 101.7. Would like to call attention in this case to the large extradural hemorrhage and to the fact that a subtemporal approach allowed ligation of the main trunk of the middle meningeal artery.

CASE II: J. W. Injured May 25, 1912, by jumping twenty feet head first on to a cement floor. Object suicide. Entered hospital profoundly unconscious, muscles relaxed, stertorous breathing, subnormal temperature, pupils dilated and fixed, vomiting, free drainage of blood and cerebro-spinal fluid from right ear. Few hours later temperature was 103, pulse 112, lumbar puncture bloody and showed great pressure. Next day discharge from ear stopped and temperature rose to 104. Patient went into coma, loud, irregular breathing, irregular pulse, loss of bladder and rectal control. A right subtemporal drainage was done. Right temporal bone fractured. Dura dark and bulging. On opening dura, clots, bloody fluid, with considerable brain substance, ran out. Next day patient much better. Had bladder and rectal control, temperature dropped from 104 to 99.4; would answer questions. Next day temperature jumped to 106 and he died.

This is one of the cases of intracranial injury which might be considered as primarily fatal and usually die within twelve hours or less whether

operated on or not. They are the cases in profound coma, fixed pupils, stertorous breathing, high primary temperature or subnormal temperature, and complete muscular relaxation. I have done a primary double basal drainage, without anesthetic, in five such cases but the results have all been the same, death within a few hours.

CASE III: J. S. Injured June 10, 1913. Struck by a train. On entrance was unconscious, vomited, pulse 48, blood pressure 115, had compound depressed fracture of right parietal region. Taken at once to operating room. Depression raised, no injury to dura and dura not opened. Two days later temperature was 104, pulse 98, semi-conscious, noisy, loss of rectal and bladder control, no choking of discs, lumbar puncture showed clear fluid under pressure. Condition remained same, with temperature of from 101 to 103 until June 24th, two weeks after the injury, when permission was given by relatives and a right subtemporal drainage was done. Great bulging of dura. On opening dura clear cerebro-spinal fluid squirted on the operating room table, leaving a marked concavity on the surface of the brain. Temperature at once dropped from 103 to normal, but there was no improvement in mental condition. He was restless and in retaining jacket most of time. On July 7th, about four weeks after the injury, a left drainage was done. The same enormous pressure was found. A large decompression was done and he was drained for seventy hours. He at once began to improve. Became quiet and easy to manage. Would feed himself, roll bandages, etc., but talked Greek constantly, and continued to have loss of bladder and rectal control until August 10th, two months after the injury. He acted in a normal way but talked "foolish" as his Greek friends claimed. On September 24th, we gave it as our opinion that his mental condition would be impaired permanently. When he appeared in court he answered every question as to his early life in Athens correctly. But he remembered nothing from the time he left Athens, in fact thought that he was still there. Soon after this intelligent Greeks told me that he was improving and that when he left for his home in Greece he was practically recovered.

I feel justified in saying that the operation saved this man's life or at least saved him from the insane asylum. I also feel justified in saying that the delay in operating endangered his life and prolonged his disability. Operation was strongly objected to by his relatives as they were afraid it would be fatal and they said that his family would get more if he was insane than if he died. Attention is called to the fact that his temperature remained from 101 to 104 from June 10th to June 24th, when it dropped to normal following his first basal drainage. I have had one other case of marked mental derangement recover completely

after a bilateral basal drainage with a large decompression on one side. In this case, however, there was but little cerebro-spinal fluid increase but a bulging brain. This man was violent and dangerous.

CASE IV: J. A. Injured August 7, 1914. Ran into street car with motorcycle. Entered Emergency Hospital with pulse of 41, temperature normal, blood pressure 118, pupils normal. In two hours had a general convulsion, more marked on the right side, left pupil contracted, right dilated. One hour later a right decompression without drainage was done by attending surgeon. Same night pulse was 74, temperature 101.2. No improvement in mental condition. Came under my care four days after injury. Was unconscious, temperature 99.4, pulse 44 to 50, blood pressure 150, slight choking of nasal side of right disc. No lumbar puncture. A left basal drainage was done the same day. On elevating brain a large amount of dark bloody fluid appeared with some small clots. Rubber tube inserted beneath brain. Drain left in thirty-six hours. Three hours after operation he asked for a drink of water. Next day was entirely rational. Pulse 68 to 74, blood pressure 130. Returned to work October 12th, five weeks after accident. Recovery to date complete.

CASE V: P. G. Age 43. Lineman for telephone company. Injured August 7, 1915, by falling from a wagon on to back of head. He had been drinking and the case demonstrates the too frequent mistake of treating an intracranial injury as a "drunk." He was taken to a hospital and entered as a "drunk." There was no external evidence of a skull fracture and no evidence of injury to the scalp. His clothing was not removed, and the next morning at five he was discharged. After wandering about the streets for some time he found his home. I first saw him six days after the injury. During the six days he was semi-conscious, at times would talk rationally, would go to toilet when occasion demanded, complained of headache, and would insist on walking about the house. Examination showed a slight choking of both discs, blood pressure 150, pulse 52, pupils normal, temperature normal. No local symptoms. His reflexes during the next twelve hours varied, especially the knee jerks and abdominal reflexes. There was nothing to indicate which side should be opened. He was left-handed, so a left basal drainage was done. There was a marked bulging of dura, no pulsation. On opening dura there was increased amount of cerebro-spinal fluid, but it was not bloody. There was a marked bulging of brain, and for this reason as large a decompression as possible was made. Following the operation there was no change in his condition until the fourth day, when he seemed brighter. On the night of the fifth day he was very restless and was given two doses of Morphia because of the headache. The sixth day he became worse. There was a marked increased choking of right disc, no change in left disc. His blood pressure was 178. That night

he became deeply unconscious. The next day, fourteen days after the injury, a right decompression with basal drainage was done through a curved incision. Large opening was made through temporal bone. Dura was dark and bulging. On opening dura large amount of old dark blood squirted out. Beneath dura, near base, was clot size of walnut, and inner surface of dura stained with blood pigment. Clot removed, brain elevated and considerable dark blood and two small clots appeared. Drain through stab wound. Three hours after operation knew his wife and asked about his surroundings. The same evening was completely rational and requested to have his insurance papers filled out. Next day headache completely gone. Choked disc disappeared slowly and he complained of disturbance of vision for several days. Drain removed in twenty-four hours and stitches in forty-eight hours. Two weeks after operation asked to return to work. Recovery complete with normal vision and returned to work October 4th.

Cases four and five show the mistake of being satisfied with an unilateral operation. They also show the impossibility of foretelling which side of the skull should be opened. Neither case showed any external evidence of a basal fracture. Both had a subdural hemorrhage. In one case this hemorrhage was on the side opposite to the choked disc and in the other case it was on the same side as the marked choked disc. The two cases also demonstrate the value of a choked disc and increased blood pressure in the diagnosis of intracranial tension in the so-called closed cranial injuries. These cases demonstrate that if there is no improvement after a reasonable length of time, after operation on one side, the other should always be explored.

In conclusion I do not wish to be understood as advocating surgical intervention in every case of unlocalized intracranial injury but only in those cases where it is indicated and also where there is doubt as to its indication. The operation is simple and harmless and in no case has there been cause for regret at having operated. There is a large percentage of intracranial injuries that are primarily fatal, where the mortality cannot be reduced with or without operation, there are cases where the patient will recover whether operated on or not, either because of the non-severity of the injury, or because of relief from pressure afforded by the injury itself or by a lumbar puncture, repeated as needed, some of these will recover completely, others with cerebral complications; and there is a large percentage that will recover only after surgical intervention, some of these recovering after a drainage on one side, others only after a bilateral drainage.

SENILE PARENCHYMATOUS HYPERTROPHY OF THE BREAST.*

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It is my purpose here to call the attention of the general practitioner to a not uncommon disease of the female breast, a disease which, originally benign, may and undoubtedly does lead to cancer in a not inconsiderable number of instances.

As far as I am able to learn the condition was first described by Réclus¹ of Paris in the *Gazette des Hôpitaux*, July 7, 1887. It was termed by him *multiple cystic disease of the breast* and was known for a long time as the *maladie cystique de Réclus*. Other observers have given it other names. Thus Koenig termed it *chronic cystitic mastitis*, Schimmelbusch called it *cystadenoma of the breast*, Warren knows it as *subnormal involution* and Bloodgood considers it a *senile parenchymatous hypertrophy*. These are all different names for one and the same condition, a multiple cystic disease of the breast characterized by the slow formation of small grape like bodies.²

While the clinical manifestations are fairly uniform the pathologic picture is not a constant one, several types of the growth having been described.³

First. The distinguishing feature of the first type is the presence of smooth-walled cysts. They are usually multiple and of larger or smaller size. Their walls are lined at first by one layer of lower columnar epithelium. Later, as the pressure from the retained secretion increases, the epithelial lining disappears. The fluid content of these cysts is usually turbid and of greenish or brownish color, never bloody.

Second. In this variety the breast has recently been the seat of a subacute inflammation. Both the parenchyma and periglandular connective tissue exhibit evidences of a low-grade inflammation.

Third. This type is more distinctly adenomatous in character. Here both the glandular acini and the cysts are found filled with masses of cells due to cell proliferation from the walls or to a papillary outgrowth simulating an adenoma.

On fresh section types 2 and 3 present a very similar appearance. The picture suggests that of fibro-adenoma, except that the process is diffuse

and not encapsulated. The chief changes observed are dilation of the ducts and acini. Papillomatous ingrowths are also frequently present. The interlobular connective-tissue stroma is well marked.

Fourth. This is the transition stage from the adenoma to the carcinoma. The pathologic picture presented cannot be distinguished from that of adenocarcinoma.

The importance of the early recognition⁴ of this condition is very great. The more clearly the anatomic picture corresponds to the adenomatous type the more likelihood of the later cancerous development. The more marked the cystic development and the larger the cysts, the less tendency there seems to be to the formation of cancer (Bloodgood).

The condition is fairly common. It may occur at any time of life, but is most often observed at or about the time of the menopause. The etiology is obscure; a careful study of my personal observations fails to throw any light on it. Trauma and inflammation can hardly be considered definite causes. The condition is more often seen in women who have borne children, but, indeed, the majority of women are in this class.

The diagnosis is at times easy, at times difficult. The woman's attention is apt to be primarily called to an enlargement of the breast, to a general feeling of fulness or to the presence of a lump or lumps. The first symptom may be pain. Rarely is there a discharge from the nipple.

The breast may be simply enlarged or full. More often one or more lumps will be felt. These are apt to be semi-solid to the feel, movable on the underlying tissues, the skin over them being movable and unaffected. The nipple is apt to be normal. Rarely will palpable glands be felt in the axilla or above the clavicle. One or both breasts may be affected; indeed, the condition has a tendency to involve both breasts.

Management consists of a thorough removal of the affected breast. The curved incision at the outer, lower margin of the breast is a favorite one with me; through this the breast can easily be everted on the chest wall and carefully examined and removed from behind. In a considerable number of cases the nipple may safely be left, and by carefully applied, buried catgut sutures the contour of the parts can be fairly rehabilitated. I have

*Read at the forty-second annual meeting of the Colorado State Medical Society.

¹I have recently read that Réclus has seen 160 cases of this disease, but I am unable at this time to find this reference.

²I make no doubt that by early recognizing and operating upon these breasts which are the seat of abnormal involution we shall be able to forestall cancer in an increasing number of instances.

³Koenig's Surgery, Volume 3, page 568.

⁴Sasse (*Langenbeck's Archiv*, bd. LIV, heft I) as a result of a study of the very large amount of material in von Bergmann's clinic, concludes, with Réclus and Schimmelbusch, that the polycystoma of the breast comes from the pure epithelial growth and cystic dilatation of the acini. This seems to be the generally accepted theory of the development of this condition and is opposed to the inflammatory theory set forth by certain observers, of whom Thivenot and Almatrim (*Providence Med.*, 1908), may be cited as examples.

found this procedure very satisfactory. The wound is closed without drainage and a sub-cuticular stitch ensures a negligible scar.

Emphasis is to be laid on the fact that in many instances pre-operative diagnosis is uncertain and the operation itself is exploratory. Should one or more large, segregated cysts be found they may be removed, but whenever the disease is typical, with multiple cysts, nothing short of entire breast excision will suffice.

I have removed 17 breasts* affected with this disease from 14 women. In one instance both breasts were involved and removed at the time of the primary operation, while in two other cases a woman who had suffered excision of one breast returned for removal of the other. Further, I have knowledge of one additional case in which I removed the right breast, and the left was excised for the same condition during my absence from town one year later by another surgeon. In all cases the women made a prompt recovery without accident or incident. There has been no occurrence of malignancy in any of these patients. In each instance the breast was thoroughly examined microscopically by one of our Denver pathologists and a copy of the histological report attached to the original history.

As illustrative of these cases I may cite the following instance:

Mrs. X., aged 35 years, referred to me by Dr. F. W. Kenney. The patient had been married ten years and was the mother of four healthy children. There was no family history of cancer, tuberculosis, or other constitutional disease. The marital and menstrual history were negative. She nursed all her children and never suffered from abscess of the breast or more than transient hardening. There was no history of trauma. Three months previously she first noticed a fullness and "lumpiness" in both breasts. The breasts materially increased in size but did not change during menstruation. The patient thought that recently she had felt a dull pain in both breasts. She had not lost in weight or in strength, had no "rheumatic pains," and no cough. Her appetite and general health seemed to be quite as good as at any time. *Examination:* Both breasts full and enlarged. Each breast the seat of movable tumors. These were segregated, movable on the underlying tissues, the skin over them free and movable. They seemed semi-solid and resistant, and hardly tender on pressure. Both nipples normal; there was and had been no discharge from either. Examination of the axillary, supraclavicular and cervical spaces negative. Both upper extremities normal. Chest and abdominal examination negative. Nothing to be found in addition to the breast tumors.

A provisional clinical diagnosis⁵ of senile parenchymatous hypertrophy of both breasts was made and both were removed through peripheral incisions at St. Luke's Hospital November 19, 1910. The late Dr. Henry S. Denison made the following histological report:

"Both breasts show the same diffuse process throughout, *i. e.*, on microscopical examination; pink dotted areas of parenchymatous hyperplasia $\frac{1}{8}$ to $\frac{1}{2}$ inch in diameter, and numerous cyst- and duct-like spaces, smooth walled and varying in diameter from $\frac{1}{16}$ to $\frac{3}{8}$ inch, filled with inspissated yellow, creamy material. This material examined microscopically was found not to be pus, but masses of myelin-degenerated epithelial cells, free myelin granules, fatty acid crystals and an occasional leucocyte.

"Sections examined microscopically show a distinct parenchymatous hyperplasia (already noted microscopically) and find every acinus completely surrounded by its smooth muscle investment. In no place is this investment found to be perforated in my sections. All stages of ectasia are present, from the slightest possible dilatation of the lumina of the acini, to the large cysts and swelled ducts, noted microscopically, which are everywhere lined by a flattened epithelium."

In a number of doubtful cases I have derived much satisfaction from a histological report made to me in the operating room during the progress of the operation.

In none of my cases has the pathologist reported evidences of cancer, but I am keenly alive to the fact that this is contrary to the experience of other surgeons. W. J. Taylor of Philadelphia (*Annals of Surgery*, Vol. 52, 1910, page 252) reported that "in 26 cases of cystic disease, 13, or just 50 per cent. had undergone some form of carcinomatous degeneration at time of operation." This liability to carcinomatous change was emphasized by Rodman⁶ in presenting the subject for consideration by the members of the Section on Surgery of the American Medical Association at its meeting in 1912. In discussing Rodman's paper Bloodgood stated that in examining histologically something like 50 cases of senile parenchymatous hypertrophy cancerous change was found in nearly one-half. Finney⁷ contents himself in saying that the treatment should be influenced by the fact that in a large proportion of these cases, estimated at from 10 to 50 per cent. by various authors, carcinoma subsequently develops. I am unable to reconcile with this the fact that cancer was not found in any of

⁵This was correct in this instance, but it is to be remembered that it is often impossible to make a correct diagnosis before operation.

⁶In a recent personal communication Rodman writes: "I can safely say that at least 25 per cent. of my cases of abnormal involution have undergone undoubted malignant change."

⁷Keen's Surgery; loc. cit.

*From time to time I have exhibited pathological specimens at meetings of the Denver Clinical and Pathological Society.

my cases but accept it as a fact, and also accept and firmly believe the general statement that cancer is to be expected in a very considerable proportion of all cases, and that this renders imperative the early and thorough removal of the affected breasts.

A STANDARDIZED TREATMENT OF WOUNDS—REPORT OF 77,000 CASES.

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One would naturally infer that the treatment of open wounds is of such an elementary surgical nature that it is hardly worthy of discussion, and it is quite true that the surgeon of to-day is prone to dismiss the subject without giving it the thought and attention that is due it. When we take into consideration the tremendous number of open wounds sustained in this country during the course of a year, and the infections arising therefrom, we are brought face to face with a very serious problem. While much improvement has been shown since the era of antiseptics, in the treatment of wounds, we have not as yet achieved satisfactory results in the prevention of infections.

The Industrial Compensation Commission of New York State reports that 17 per cent. of the cases applying for compensation are infected. We can assume that other states would show a like percentage of infections. This is, indeed, a rather shocking state of affairs and one that should be speedily remedied. The vast majority of these infections are due to ignorance, or carelessness, on the part of the injured to report promptly for treatment; lack of efficient surgical organization and equipment to render adequate treatment; or even carelessness on the part of the attending physician. The short-comings of the profession can hardly be attributed to ignorance of such elementary principles.

It is the duty of every doctor to devise and carry out a system of aseptic technic which will secure a minimum of infection. Statistics will show if no treatment is given, or if the case is improperly treated, that 50 to 75 per cent. are infected. When we consider that it takes three times as long for an infected case to recover as a non-infected case, the economic phase must be apparent to everyone. The infection is also productive of much suffering, even to the loss of extremities and sometimes death. How many deaths have resulted from carelessness, ignorance and neglect? How frequently do we see ankylosed joints and functionless extremities, which

are directly due to infection, which could have been prevented had they received proper care and treatment?

The vast majority of open wounds are, theoretically, infected, but can be rendered aseptic by a thorough, simple, aseptic technic. The same careful attention to technic should be applied in the treatment of these cases, as in a laparotomy.

In conversation with a medical colleague some time ago, I was advised of a meeting of a local medical society in a nearby town, where the subject for discussion was to be "The Treatment of Open Wounds." The author of this paper stated that very few of the members of this society took the necessary precautions to prevent infection and that from 75 to 80 per cent. of wounds treated were infected.

We frequently find doctors, responding to emergency calls with a handbag which contains unsterilized instruments and dressings, who attempt to suture and treat wounds with these infected materials, without any attempt at surgical cleanliness. Efforts should be made to discourage this practice. It is not unusual to see a few bi-chloride tablets dissolved in a basin of ordinary tap water, this being used instead of sterile water, with apparent indifference on the part of the doctor. If it is impossible to secure surgical cleanliness at the place of accident, no attempt should be made to treat the wound, other than to combat shock or hemorrhage and to protect the wound from further contamination, until more favorable surroundings can be secured. The probing of wounds and examination by unwashed hands should be vigorously condemned.

With the idea in mind of perfecting or standardizing a surgical technic in the treatment of wounds, the writer with three of his assistants outlined certain rules and principles to be followed. During the five years, approximately 250,000 men have been employed. We have classified open wounds as—incised, punctured and lacerated, and have considered every case in which there was a solution in the continuity of the epithelium, as an open wound which was favorable for infection, if not properly treated. In submitting the following rules to our Works' Surgeons for their guidance in surgical technic, we did not assume that the methods of procedure here laid down were the only good ones. We fully realize that other methods are now in use by our surgeons, that are producing excellent results, yet we have endeavored to formulate for each condition one or more well tried and successful method. We have urged, for the sake of

uniformity, that the surgeons adopt these methods, so far as their surroundings and equipment will permit. Yet, we have allowed each surgeon the fullest latitude in the choice of methods, only asking that he use a treatment for each condition that is in accord with the principles of modern surgery.

We are aware that no set of rules can be formulated that will fit every case or will be fully adapted to the varied conditions under which our surgeons work. We insist that each case be treated as a separate problem and be given the best that is known for his safety, his comfort and speedy recovery.

In choosing a line of treatment for any injured man, the following are some of the factors to be considered:

1. Nature and gravity of injury.
2. General physical condition.
3. Home surroundings of patient.
4. Distance of his home from the Emergency Hospital and General Hospital.
5. Equipment and general condition of Emergency Hospital.
6. Limitations of surgeon himself.
7. Occupation of the patient.
8. Intelligence of patient and his willingness and ability to co-operate in the treatment.
9. The wishes of the patient and his friends. This may especially be considered in deciding whether to send a patient to General Hospital.

In choosing a way of handling each injured man, all of the above must be taken into consideration, and the standard rules for technic so modified and adapted as to bring about the best results.

Bearing in mind these varied conditions and having full confidence in our surgeons to adjust them to their individual needs, we submit the following:

The Treatment of Open Wounds.

- (a) Cover wound with sterile gauze, cleanse surrounding area with tincture of green soap and sterile water.
- (b) Shave surfaces covered with hair, two or more inches from wound.
- (c) Cleanse surfaces covered with grease with benzine or gasoline.
- (d) If iodine dressing is to be used, dry shave, but do not wash with water.
- (e) After surrounding surface has been cleansed, remove the compress and cleanse wound with tincture of green soap and sterile water. Thoroughly irrigate with sterile water bi-chloride 1/2000, cyanid 1/2000 or Oschner's solution.
- (f) Remove foreign bodies with sterile forceps.
- (g) Remove all shreds of devitalized tissue, but be conservative in doing this.
- (h) Cauterize all punctured and dirty lacerated wounds with pure carbolic acid, followed with alcohol and dress with dry gauze.

Dressings.

Either of the following methods may be used:

1. **DRY METHOD:** Mop every part of the wound with a cotton wound applicator saturated with a 5 or 10 per cent. solution of iodine and suture as indicated. Swab wound and a few inches of surrounding skin with tincture iodine, apply sterile gauze and cotton and lightly fix dressings with bandage.

2. **WET METHOD:** Apply sutures as indicated and dress with sterile gauze saturated with Oschner's solution (saturated solution boric acid 75 parts and alcohol 25 parts), cover with cotton and fix dressings with bandage. Re-moisten dressing twice in twenty-four hours.

Subsequent Dressing of Wounds.

1. Make as few re-dressings as is consistent with good work.
2. Never permit a patient or his friends to remove a dressing.
3. If a wet dressing is used, continue until danger of infection is passed.
4. If iodine dry dressing is used, repeat iodine, or apply sterile gauze every three or four days, according to the nature of the case.
5. Re-dress with gauze saturated with balsam of peru, either plain or 50 per cent. castor oil wherever indicated.
6. In old granulating wounds, stimulate where necessary with scarlet red ointment, silver nitrate, tincture iodine or curettage.

Before the standardization of wound treatment, numerous methods were in vogue, each surgeon being of the opinion that his own methods were the correct ones. In the treatment of burns, for example, investigation showed that almost every drug in the pharmacopoeia was being used, and in each case the doctor was reporting good results from his own specific remedy (?). We frequently find proprietary ointments in use, which contain five to ten different drugs, each being highly recommended by the manufacturer and accepted by the doctor without any consideration of the underlying pathological principles.

The following table indicates the number of cases treated, the technic used, the number of cases infected during the course of treatment and percentage infected:

Total Open Wounds.	Technic.	No. In- fected.	Pct. In- fected.
55,191	Thorough cleansing with tr. green soap and sterile water, the wound being protected with sterile gauze. Grease and oils removed with benzine or gasoline; wound irrigated or cleansed with bi-chloride 1/1000 or 1/2000 solution. Dry gauze dressing.....	75	.0013
3,043	As above, plus the swabbing of the wound with 7% tr. iodine.....	0	
7,152	As above, except sterile water used to cleanse wound and a moist saturated solution horacic acid, gauze dressing applied	13	.0018
8,639	As above, with exception tr. iodine and dry dressings were used exclusively....	9	.0011
3,529	As above, with exception of Oschner's solution (75% Saturated Boric Acid solution, 25% alcohol) with constant wet dressings	0	
77,554		97	.0012

The most important conclusion to be derived from this standardization of treatment is that the thorough cleansing of the wound with tincture of green soap and water is productive of the best results. Tincture of iodine has, however, been successfully used in the treatment of small wounds without previously cleansing with green soap. This is to be instituted as soon as possible after the receipt of the injury. If the wound is thoroughly

cleansed, it is comparatively easy to keep it in an aseptic condition. It is of course understood that every aseptic precaution must be taken.

While the number of infections given in the above table does not represent the total number of infected cases treated, it does contain the number of infections of wounds in which the injured reported promptly for treatment. The number of infections is practically nil where the injured report immediately after injury and when they report regularly for dressings. Some of the above infections can be traced to the interference with dressings. It must be remembered that these cases are confined entirely to employees in the iron and steel industry, each company having a surgical organization which co-operates and is in harmony with the operative management. The following bulletin has been recently issued and given much publicity:

Wound Infection.

Wounds heal very fast if they are clean. When we say clean, we mean not only clean of dirt, but also clean of invisible germs. These germs lie on the skin and often on the tool or whatever causes the wound. When the germs are not cleaned out from the wound at once there may be enough to cause blood poisoning.

The best way to prevent blood poisoning is:

1. To clean the wound thoroughly at once.
2. To keep it clean by putting over it a clean piece of linen which has been boiled, or a piece of sterilized gauze.
3. To hold the above firmly in place with a bandage.

The best way to cleanse a wound is with gasoline, using plenty of time and a clean piece of linen to wash with. Clean the skin all around the wound and wash into the wound itself. Then paint the wound and neighboring skin with tincture of iodine; this kills the germs.

If you have no iodine and gasoline handy, scrub the wound thoroughly for five minutes with soap, hot water and a scrubbing brush. Then wash the wound with alcohol (whisky or brandy if there is no alcohol) and put on a piece of clean linen, wringing wet with alcohol or whisky. Remember that the scrubbing is the most important part of the cleansing of wounds, and do it thoroughly. Don't be afraid of any slight bleeding caused by cleansing. The bandage will stop it.

When there is a plant physician, it is best of all to go to him at once for the treatment of any wound, however small.

NOTE: Never use shop rags or waste for cleansing or covering a wound. Use only sterile gauze or clean linen which has just been boiled.

(Prepared and approved by the Industrial Hygiene Committee. Distributed by National Safety Council, Chicago, Ill.)

A very extensive experience in the treatment of wounds has forcibly impressed upon us the danger of having untrained first aid crews, or others, attempting to cleanse wounds under unfavorable surroundings. The best results obtained by first aid crews, and others not professionally trained, have been, as before mentioned, secured by the application of tincture of iodine to the wound and surrounding parts; this to be followed by sterile com-

press and bandage, with instructions that the injured report to the doctor at the very earliest opportunity. It is a very dangerous practice to place in the hands of the untrained and unskilled a scrubbing brush which is not sterile, water which is of questionable sterility, with instructions to scrub thoroughly for five minutes. It is quite likely that this procedure is productive of more harm than good. The general teaching of those having much experience in first aid is to make the dressing of the wound as simple as conditions will permit. The local environments of the average industrial shop are such that the technic as described in this bulletin is impractical, and would unquestionably produce much harm if generally adopted.

The recent efforts of the American First Aid Conference to standardize first aid methods, packages and equipment, together with first aid instructions, should receive the hearty support and co-operation of all those interested in this movement. The First Aid book published by the American Red Cross Society has answered every requirement and should be adopted as the standard work on this subject. If we fail to standardize our methods, it is sure to cause much misunderstanding and confusion.

In conclusion, the writer wishes to express his appreciation to his associates for their valuable assistance and co-operation in the attempt to "Standardize the Treatment of Wounds"; to the Committee on the "Standardization of Technic," Doctors Urmson, Johnson and Colcord, is due much credit for their conscientious and painstaking efforts.

BLASTOMYCOSIS OF THE BONES.

The affections of bone are: Osteomyelitis, peritonitis and arthritis. The osteomyelitis, which is suppurative in its nature, may be diffuse or localized. In either case the fungi are very numerous, involving the marrow compartments and causing necrosis of the marrow, with the formation of purulent exudate. In the long bones, the infection has a tendency to lodge in the epiphyses, suggesting the appearance of infarcts. Extension from the epiphyses is usually responsible for the joint lesions. The long bones of the extremities, the vertebral column (simulating Pott's disease) and the pelvic girdle, more rarely the cranial and facial bones, and smaller bones and joints of the extremities, are the seat of the systemic lesions. —RUDOLPH MATAS in *The New Orleans Medical and Surgical Journal*.

WHEN, WHERE AND HOW TO AMPUTATE, WITH TREATMENT OF GAS BACILLUS INFECTION.

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DETROIT, MICHIGAN.

I presume that, when you read the title of this paper, you at once concluded that I had chosen a large subject, comprising a field altogether too extensive for thorough cultivation. The same thought occurred to me, yet there seemed to be no other way of covering the ground I intended to cover than by going over the entire field. As the paper is rather lengthy permit me to start without much prelude.

I am convinced that by changing at least some of the methods and practices, now in vogue, we may save the lives of many of our fellowmen and alleviate to a great extent the sufferings of those who are unfortunate enough to lose through accident or disease an entire limb or part thereof. My own experience and that of others has taught me the lesson that we are in the habit of waiting too long before amputating. I stand for early amputation. The amputation should be made as soon after the accident as it is possible to transport the patient to the most suitable place for the work under prevailing circumstances. The rule that most of us have been following and which is advocated by many surgeons, is to wait until the patient recovers from the shock of the injury. We have been taught that immediate amputation greatly adds to the shock already existing. Now let us see what shock is. Shock is a lowering of the vital force as a result of deterioration of brain cells, divided into two classes—mental and physical. Mental shock is more profound by far than physical at times. Mental shock is produced by impressions and can be produced without physical injury. Physical shock is produced according to our best authorities to-day, principally by loss of blood; a hemorrhage ever so small produces shock accordingly. Now then, where an injury is severe enough to make amputation necessary the patient as a matter of fact almost always has lost a large amount of blood, and, until the amputation is made, it is almost impossible to control hemorrhage completely. Furthermore, after a considerable amount of blood has been lost by the first gushing the oozing that continues from the bruised tissues, is, in reference to shock, much greater, in proportion, than the large amount of blood lost primarily. Therefore as long as the oozing continues, shock increases and the resistance of the patient grows steadily less. If, on the other hand,

we have infectious matter incorporated in a wound, the longer this remains there the more powerful the enemy grows and the less encouraging our fight for the life of our patient. Here too then we can only gain by early amputation. Tissues, when first crushed, have a mighty low resistance and tissues of this kind furnish the ideal soil for our enemies, the anaerobics, especially when we assist them in their deadly work by closing up the wound and excluding the oxygen. Such treatment is the best means of preparing a splendid field for the development of the deadly gas bacillus and malignant edema. These bacilli, once thoroughly established, are extremely hard to get rid of. Therefore, let us act at once and take no chances. Whenever we permit precious time to step by, whenever we let six, twelve, twenty-four, even thirty-six hours pass by, idly watching, waiting for our patient to recuperate, it is then that we offer these ever ready germs the best opportunity to get in their destructive work. It is true, some of the less dreaded pus germs may gain entrance into the system and cause a septic condition despite all efforts to prevent such a mishap, but nature is generally easily able to take care of these few scattered ones. When, however, time has been allowed to elapse and a large army of them has grown in the fertile soil and hence entered the blood stream, she becomes overwhelmed and unable to cope with them. What is there that we should do in order to protect our patient, lessen his danger and give him the best chance for his life?

The first thing to do is to combat shock and control hemorrhage. Administer at once a sufficient dose of morphine hypodermatically. Of all agents vaunted for the combatting of shock, it is the greatest, and I firmly believe that any physician not using it in this emergency is guilty of criminal negligence. I use one quarter grain doses as often as necessary, that is to say, until the patient is thoroughly under its influence. At the same time stop hemorrhage by any and all available means and apply heat to the body, using any agency that may be at your service under these most generally trying circumstances. Next, with all possible speed move your patient to the place where an amputation may be done with the greatest safety which your environments may offer. A hospital, of course, is always the best place for this work, because you have every convenience and trained assistance. At times, however, a private dwelling, a barn, any sort of shelter may have to answer our purpose. Where there has been exhausting hemorrhage the normal saline solution

must be used either by hypodermoclysis or proctoclysis. I prefer the latter method, as we are not so liable to do harm with it. Saline solution acts like a great many other remedies. It works for good or evil. If the amount you give is too large, it becomes very harmful to your patient and may cause serious trouble, as the system will stand just so much of it and no more. My rule is—the more blood your patient has lost—the more cautious you must be in administering saline solution. When there has been a moderate loss of blood you may give a larger amount of the solution with tolerance than where there has been a profuse hemorrhage. Bear in mind that, in giving saline, the system will only take up that amount which the red corpuscles are able to handle. When this has been exceeded, harm follows instead of benefit. Never should there be more than one pint at first. Sometimes it is best to give one-half of this amount and repeat often, *i. e.*, every two or four hours. If the demand for saline is very urgent, the first dose may be given by hypodermoclysis, but after that I prefer proctoclysis for the reason that, when the system has all the saline it can take care of, it will reject the surplus, whereas by hypodermoclysis we may unintentionally administer too much without being able to provide a ready safety valve for the escape of the surplus. I give from one-half to one pint by hypodermoclysis, and, according to improvement noticed in my patient, in two or four hours another pint by proctoclysis. This I repeat from two to four times. When using saline in this manner, I am sure of not waterlogging my patient, I know I do good; I am sure my patient will not succumb to the effects of an unreasonable unscientific procedure, which I will call "drowning."

Too much cannot be said on this point, as too many of us are treating this subject lightly without thinking of what harm may follow. Several cases have been brought to my notice in the past year, where I am positive the patient passed over the "Great Divide" by way of an excess of saline, administered in the best of faith, but with precious little reasoning.

Next comes the important question—Where to amputate? I am not going to take up your time by citing all that you may read at any time, in any good work on operative surgery, but it is my intention to bring to your notice some very important points that I feel have been overlooked, and which may have a tendency to enable us to relieve a great deal of the suffering that often follows amputation. It has been said many times that almost any one can do an amputation. True,

most any one can cut flesh and saw bone, providing he has the courage. Many a man may build a motor, but will it run? Any surgeon who does a good amputation with the least subsequent pain to the patient must necessarily be possessed of considerable surgical skill, and a large amount of common sense. As to theory, why a great many amputations varying in technic and procedure have been advised by medical authors. Some of them look beautiful on paper, and the description accompanying the cuts read enticingly well, but how often does not the possessor of a stump resulting from such a wonderful operation go through life with a great deal of discomfort?

Of the many men who amputate, even of the many surgeons of reputation, nine out of every ten never stop to think where and how the individual minus a leg will bear his weight with the greatest comfort.

I once read an article by one of our celebrated men, which lays great stress on the prevention of atrophy of the stump, and which makes no exception as to the part of the leg where the amputation is performed. Now as a matter of fact, when an amputation is made below the knee, the patient cannot wear an artificial leg with any degree of comfort until after the muscles have shrunk and the stump becomes more or less atrophied. The weight of the body does not rest on the end of the stump. In an amputation below the knee, the weight of the body is supported by the tuberosities, and when the artificial leg is properly fitted there is no drawing upon the stump and very little inconvenience from pressure. One of the common errors in amputation below the knee is saving as much tissue and providing as long a stump as possible. For the future comfort of the patient the center of the middle third is the best site for amputating, in order to secure a good, useful, I may say comfortable stump. When a stump is left longer than that, it becomes troublesome, and it is very hard indeed to fit an artificial leg so as to give satisfaction. If you can save four inches below the knee joint, you may have a very good stump as far as usefulness and comfort of the patient are concerned.

There is more inconvenience and pain produced by the fibula than by the soft parts, unless the Kocher operation is performed. This operation is not always successful on account of the fact that we are liable to get an exostosis and thus a large and painful stub. I am now about to offer a suggestion which I presume the majority of you will vote down, and that is the removal of the fibula.

If this bone is removed we obviate the discomfort which is produced by the pressing together of the two bones, and we also have a better surface at the tuberosities. The patient will experience a great deal of comfort during the first year or two that otherwise he would not have had and for the future he will have a stump fitting more perfectly into the socket of the artificial leg. I know of no reason why the fibula should be left in, with the exception, as I have said before, of making the patient uncomfortable. In dealing with the ends of bones, at the time of amputation, peel the periosteum back for a quarter of an inch and excavate the marrow with the ideal instrument for this work, a sufficiently large burr, such as is ordinarily used for countersinking. When the periosteum has been turned and the lower end of the medular canal has been excavated, the nerve cut sufficiently high, your patient will have a very comfortable stump. If these minor details are neglected, he will always suffer more or less pain, no matter how well the artificial leg has been adjusted. Notwithstanding the fact that many of our best surgeons tell us to be cautious about stump shrinkage or atrophy, the more rapidly this very shrinkage can be accomplished the less time it will take to fit the patient with a comfortable artificial leg. These latter remarks refer only to amputation below the knee.

When the amputation is done above the knee, it is not so essential to have atrophy take place. In fact it is somewhat more desirable not to have it take place.

It is evident that in any amputation it is always best to go far enough in order to avoid unhealthy tissue. Many times when we attempt to save some of the crushed and lacerated portions we do so at the peril of our patient. Sense and judgment must be exercised always.

We must take great care to apply the tourniquet correctly, that is to say, as nearly to the site of the amputation as possible. It is not so long ago that I saw a very good surgeon make an amputation too far below the point where the tourniquet had been applied. Later he was obliged to make a subsequent amputation, which cost the life of the patient, as during the interval between the two amputations havoc had been wrought within the stump.

Permit me to say a word about scar line, a matter often deemed of little importance, yet the location of the scar is a matter of great concern, if you aim to have a painless stump. The scar line should never come in the center of the stump, if this can possibly be avoided.

It is always better to make a long anterior and a short posterior flap, as the scar is often extremely sensitive. It should therefore be placed out of the way, where it is not so likely to be bumped, and you can readily see that the posterior part of the stump is not so liable to injury as the anterior. Not long ago I witnessed an amputation of a thumb where the operator left a skin flap well nigh an inch long. That was not all he left. He left his patient a great deal of future trouble from a skin flap altogether too long and a scar line in the center of the stump, which is bound to be more or less in his way for months after the amputation and may never lose its sensitiveness. Had he cut the dorsal flap off almost entirely and brought the palmar flap over he would have had a very serviceable stump and one not sensitive.

I refer here to many facts that, no doubt, we all know, but I think it is a good plan to refresh our memories on these important minor points, in order that we may not lose sight of them in these days, where good, bad and indifferent innovations crowd in on us from all sides.

I cannot refrain from saying a few words on the most important subject of drainage. Often it is very difficult indeed to heal the opening, where the drainage tube has been placed and this part remains sensitive at least for a considerable length of time. This sensitiveness can be overcome by a little more care in placing the drainage and the kind of material used for the purpose. I do not consider it necessary to leave drainage in a stump more than forty-eight hours. In the majority of cases it can be safely removed in twenty-four.

I have stopped using rubber tubing. I now use gutta percha tissue folded over three or four times, and I find that this is just as effective as a large tube and causes far less trouble in the wound in time to come. When you have tried gutta percha tissue for drainage of wounds of this sort, you will never go back to the rubber tube.

Gas Bacillus Infection.—Much has been written since the beginning of the present war on the subject of Gas Bacillus Infection, but very little has been accomplished in the way of new treatment. The vaccines have been tried, but nothing definite as to results has been forthcoming. Quinine hydrochlorate has been used with the same uncertain results. To my mind the best way of treating this infection is by preventing its development by early amputation. If, however, we are so unfortunate as to have to deal with it, we must bear in mind that we have a most malignant condition to combat, and one that must be dealt with without delay.

and in a heroic manner, as this infection travels so rapidly one can almost see it spread with the naked eye. What are we to do? First open this infected area by a free incision, inject oxygen into the invaded as well as the surrounding tissues, apply peroxide and leave the wound absolutely exposed to the air. This is the treatment of the infection in a locality where amputation cannot remove the source of the trouble. Where a leg or an arm is involved and the infection is progressing rapidly, there is in my opinion but one thing to do and that is to amputate well above the involved tissues without loss of time. I have seen these cases rapidly grow worse in the short space of two or three hours. In doing an amputation of this sort control all hemorrhage by carefully tying all vessels, and leave the wound wide open, bathe the stump in peroxide, apply no dressings, let a continuous stream of oxygen play into the wound, inject oxygen into the tissues above the amputation and give internally large quantities of alcohol—that is to say, give two or three ounces of whiskey every two hours. You will say that such an amount of whiskey will put your patient into an advanced state of intoxication in a short time, but you will be very much surprised at the quantity of whiskey that an infected patient can stand without intoxication. Alcohol has been my main remedy in the treatment of sepsis. In these past years I have seen a great many cases recover as the result of this treatment, cases which looked absolutely hopeless.

GASOLINE AND IODINE DISINFECTION.

In emergency, accident and minor surgery is where this combination means most to the busy surgeon or practitioner. It is the greatest boon to surgical technique of late years, and especially to those of us not surrounded by the best surgical environments. Here its value cannot be overestimated. There are emergency cases where even light scrubbing is painful, and some where it is contra-indicated; yet these can be quickly and effectively prepared by the use of gasoline and iodine without disturbing the patient or interfering with the anesthetic.

. . . Care should be exercised not to use the gasoline too freely or allow it to gravitate to tender parts, always sponging off the excess before it evaporates. Iodine 3.5 per cent is now lightly applied over the field and allowed to dry for five minutes, again being careful not to allow it to gravitate or saturate the drapery surrounding the field; the second application is made and the field is ready. . . .

TRAUMATIC ANEURISM OF THE EXTERNAL ILIAC ARTERY.

MARSHALL CLINTON, M.D., F.A.S.C.,
BUFFALO, N. Y.

The following case having some points of clinical interest, to those interested in Railway Surgery, is hereby reported to add to the few cases so far recorded as having a successful outcome:

M. L. Aged thirty, married; was seen in consultation November 28, 1914, for a painful swelling in the right lower abdomen.

History: Parents alive and well. No history of cancer, tuberculosis, or evidences of other disease in any members of his family.

Personal history: When seven years old had an attack of typhoid fever which lasted six weeks, and following which he developed a periostitis of the left ulna. This healed in two months and has never troubled him since. Denies any venereal history. Is temperate. One child alive and well.

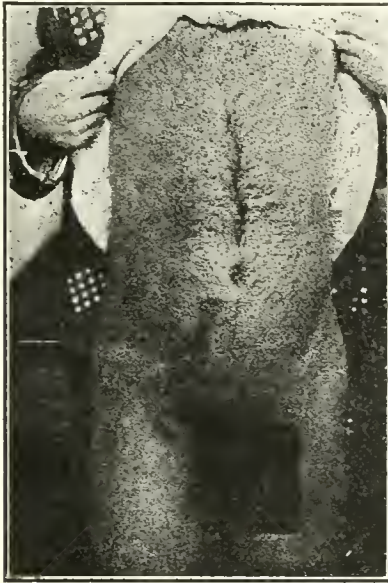
Present illness: In May, 1914, jumped onto a moving car and was swung violently against the side of the car, jamming his right side severely. Felt a hard pain at the time in the right lower abdomen, which has persisted more or less ever since. Was lame after the injury and noticed a lump appear under the tender area about six weeks after the injury, which was tender, and caused a "beating" pain. The lump has slowly enlarged in the last two months and the pain is more severe, and the lameness greater. It bothers him now so that he is unable to work.

Examination: A well-nourished, vigorous young man. Head, neck, thorax, extremities normal. Abdomen normal except for a swelling on the lower right side situated just above Poupart's ligament. This swelling has pushed the abdominal muscles forward so there is a slight bulging over the area the size of the palm of the hand visible. Palpation demonstrates a pulsation of the swelling, and the lump may be outlined on the anterior surface, and is felt to be expansible, and pulsating. A distinct bruit may be heard with the stethoscope. An x-ray shows a shadow thrown on the wing of the ilium, about the size of a bantam's egg. Blood normal, urine normal, repeated Wassermann examination negative.

Diagnosis: Aneurism of the external iliac. Operation advised.

Operation: Under double anesthesia a long incision was made over the course of the external iliac and femoral vessels. The peritoneum was opened and the aneurism outlined behind the posterior layer of peritoneum. It was firmly attached to the surrounding structures by adhesive action and about the size of a bantam's egg. It was evidently not of the fusiform type but a sacculated aneurism. The peritoneum just at the bifurcation of the common iliac was opened and the external iliac separated from the surrounding structures and a screw clamp applied, just tightly

enough to stop the pulsation in the iliac vessel. The femoral artery was then exposed and clamped in the same way just below Poupart's ligament. This stopped all visible pulsation in the sac. An incision through the sac was followed by a very brisk, sharp hemorrhage, although there was no evidences of spurting. The clot was turned out of the sac, and an effort made to compress and seize the communicating vessel that supplied the artery between the clamps. This could not be done without a greater blood loss than was deemed proper, so with one finger plugging the opening in the sac, with the sides held over the finger by two hemostats, a double row of mattress sutures, continuous, were placed to obliterate the sac. After tying



the sutures, and bringing the walls together the sac seemed obliterated. Loosening the clamp on the iliac vessel was followed by pulsation of the vessel but no apparent pulsation in the sac.

From the fact that recurrent cases of aneurism have been reported after obliteration of the sac, and that we were dealing with a large vessel having a heavy pressure behind it; it was deemed safer to put a ligature around the vessel at the point of the higher clamp. A heavy Chinese twist silk ligature was gently tied in the place of the clamp, care being taken not to tie it hard enough to bruise the vessel wall. The conclusion of the vessel with the ligature left a non-pulsating sac and a dry wound. The wound was closed in layers and the patient put to bed.

Post-operative history: The next morning the circulation in the leg was good, no change in color of the skin, or change in sensation. His "beating" pain was absent. The right leg felt slightly cooler than the left. Two days after operation he developed a slight chill, rapid pulse, up to 150, temperature 103° F., rapid respiration, pain in the right chest, and marked cyanosis. Breathing difficult and labored. His cyanosis was rapidly relieved by subcutaneous injections of oxygen gas, enough being

given to cause an emphysema over the entire left side of the chest and back. The following morning his right lower base showed an area of dullness, and his sputum became rusty. Under generous doses of morphia and subcutaneous oxygen his general condition improved and his lung cleared up, and in a few days he was properly convalescent. Five weeks after his operation he returned to his home and work. Except for a sensitive scar that has blistered from friction of his clothing, he has been well since. There is no return of the pulsation and no pain in the region of the sac. So far—nine months after operation—he seems cured.

In the table of endo-aneurismorrhaphies reported by Matas in 1908, the number of cases of all vessels operated by his method was 85, of which one was limited to the external iliac. Balch, in the *Boston Medical and Surgical Journal* reports a case, and Robineau and Cleret in 1899.

This condition while rare gives rise to an interesting operative procedure, and the successfully operative cases are living tributes to the genius and resourcefulness of Rudolf Matas.

DANGER IN TRANSFUSION.

Though the recipient is the one that derives the benefit from transfusion, he also assumes the greater risk. The principal danger to avoid is acute cardiac dilatation from too much or too rapid a transfusion with resulting overburdening of the right heart. In the cases where symptoms of cardiac embarrassment arose, the artery to vein method was used. But with vein to vein technique it is almost impossible. Another danger is the introduction of air emboli into the circulation of the recipient. A small amount seems to do no harm, but large quantities may cause death from acute dilatation of the right ventricle.—H. H. KERR, in *The Virginia Medical Semi-Monthly*.

TUMOR OF THE BLADDER VS. ADENOMA.

Tumors of the bladder, especially pedunculated growths of the trigone, may simulate adenoma by the ball-valve action closing the internal meatus. These tumors usually bleed, but since we also sometimes get bleeding in adenoma the diagnosis can only be positively made by means of the cystoscope.—WILLIAM S. EHRLICH, in *The Lancet-Clinic*.

An interesting exhibit of books and pictures illustrating the history of surgery has been prepared by Dr. Arnold C. Klebs at the invitation of Colonel C. C. McCulloch, Librarian of the Surgeon General's Office, and may now be seen in the Library Hall of the Army Medical Museum.

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WALTER M. BRICKNER, M.D., Editor

NEW YORK, DECEMBER, 1915.

THE MORPHINE-ADDICTED SURGICAL PATIENT.

We commend to our readers the reading of Dr. Ernest S. Bishop's brief consideration of drug addiction in surgical patients on another page of this issue. By his intensive clinical studies in the alcoholic and prison wards of Bellevue Hospital (where eleven hundred patients came under his care every month), and by his continued investigations in this field, Dr. Bishop has established himself as an authority on this subject.

The profession at large has been rather too apathetic concerning drug addiction—an evil that has grown to alarming proportions, especially in our large cities. And with this apathy there is an even greater ignorance of the mechanism of addiction and of intelligent management of the disease.

How common it is, for example, for the surgeon or physician in charge of a morphine addict ill with some surgical or medical malady, to make the patient's stay in the hospital an opportunity for "cutting down his dose" or even of inflicting the agonies of total withdrawal in a fatuous attempt to effect a "cure"! We are pleased to note that Bishop inveighs against such attempts, which are wrong in principle and very harmful in practice. The occasion of an operation or of a disease is not the time to withdraw morphine from the addict. It is then, above all, that he needs, in order to maintain his functions and his recuperative powers, that amount

of morphine which *his system requires* in order to keep him in "drug balance." Thus balanced he is in a, for him, normal condition, correspondingly fitted to meet the assaults of disease, anesthesia, operation; lacking drug balance, he is subnormal, and his functions suffer accordingly.

The attempt to cure morphinism during sickness or surgical treatment is based on the misconception that the addiction is largely mental, and that "if the patient can fight it out for a few days" he will be cured. He can—with awful *physical* suffering—"fight it out for a few days," but he will usually not then be cured; more likely he will be dead, or desperately sick. Not infrequently the puzzling failure of a patient to recuperate from an operation is attributable to the exhaustion of the supply of morphine he has secreted to supply an addiction that his physician knew nothing of. Most morphine addicts dread the advent of illness or surgical operation for fear that the physician in attendance will torture and sicken him in the misguided attempt to cure both afflictions at the same time. The addict about to undergo an operation should have the comforting assurance that during his surgical treatment the morphine that he requires will not be withheld. He will be a much more happy and altogether more satisfactory patient if he feels that the physician has an intelligent and sympathetic understanding of his addiction.

Like the fallacy that the morphine habitué can be cured by withdrawal for a few days is the delusion that, in the absence of other treatment, small doses can be substituted for large ones without the patient's knowledge. By its effects, the addict can estimate within a fraction of a grain the dose of a hypodermatic injection of morphine! The "hypo of distilled water" never fooled a morphinist.

There is no disputing the fact that a very large percentage of addictions to morphine, heroin and codein arise from illness in which these drugs have been administered by physicians. And here lies another common fallacy, also based on the faulty assumption that opium addiction is largely mental, viz., that the habit will not be established if the patient does not know what drug he has been given. If administered for a sufficiently long time, the addiction to morphine can be established in anyone. The drug need is created whether the patient does or does not know the nature of the drug, and he will soon learn how to satisfy that need.

It is, then, only by appreciating that morphine addiction is a biochemical phenomenon, and not a mere mental weakness or perverseness, that the addict can be adequately cared for during his surgical

ailments, and rationally treated when a cure of his habit is attempted.

In view of the unfortunate prevalence of morphine addiction it behooves the surgeon to learn something of the management of the addict temporarily under his care and, quite as important, of the recognition of addiction. Upon these subjects we hope to present to our readers further articles by Dr. Bishop.

The treatment of the addiction itself concerns the surgeon more remotely. The problem, exceedingly difficult, has by no means been solved. We are inclined to believe that its solution will not be found in any of the routine "methods" which, based largely on excessive purgation, are often distressingly severe and, equally often, quite unsuccessful. It seems to us that the problem will probably be worked out, not empirically, but in the laboratory, and by following the same line of investigations by which Ehrlich established the process of immunity and developed his studies in biochemical affinities. —W. M. B.

In the days of ancient Rome the highest ideal of human accomplishment was oratory, and Quintilian devoted volumes to the enumeration and description of the natural endowments, education and responsibilities of the orator. He must be a careful and accurate student of human nature, a philosopher, a sociologist, a humanitarian, an educator,—in short, a man of deep thought and power, able to lead men to conserve and promote the highest good of the state. In our modern scheme, where the acme of human attainment is reached in a balance of thought and action, the surgeon occupies very much the position of the orator of Rome. For besides being a master of technique and a skilful diagnostician, he, too, must "know all men"; he must be a philanthropist, philosopher, a sociologist, able to filch from each individual the greatest amount of social service with the least possible friction.

In common with the orator of old, he must possess the power to *convince*, for without it, his diagnostic skill and expertness of technique are *nil*. As often as a surgeon fails to convince a patient needing surgical treatment of his ability to restore him, just so often does he fall short of his duty to the patient, condemning him to pain and probably inefficiency, and leaving him, perhaps, a prey to quacks and charlatans. "Pity 'tis, 'tis true" that these quacks possess that convincing power, which in their hands is a menace to society, but which in the possession of the surgeon is so great a boon. Not only does such a surgeon fail in his duty to patients, but he does not measure up to his social responsibility,

in that he deprives society of the efficient services of the individuals.

"I have told the patient and his family the conditions, and now it is up to them" does not lessen the surgeon's responsibility. He must do more than tell, he must convince.

We are all aware that there are many people who are a burden to themselves and a drawback to their families, because they stand in need of surgical treatment, but we would perhaps be astounded, if surgeon census takers were to make rounds throughout the cities and list the numbers who had consulted surgeons, and who had, despite the advice of the physician, decided "to try osteopathy, massage," or "some other remedy" for a condition which could only be aggravated by time. Sometimes we find a whole family handicapped by one member who might have been cured by surgery had he been convinced of its necessity. Just force, directness, plain truth, sympathetic persuasion—these are essential to the surgeon's equipment.—R. B.

Surgical Sociology

Ira S. Wile, M. D., Department Editor.

RED CROSS SEALS.

The Red Cross Christmas Seals are already moving in all directions throughout the countries, indirectly performing a service to health and humanity. The American Red Cross and the National Association for the Study and Prevention of Tuberculosis have distributed practically 200,000,000 of these little seals, the sale of which produces funds to continue the fight against tuberculosis.

The universality of participation in this splendid enterprise is indicative of this particular value. It does not represent the effort of one man of wealth to pit his fortune against a blighting disease, but it affords an opportunity for every man, woman, or child to actively participate with small funds in a general campaign against the white plague.

The total number of deaths from tuberculosis in 1913 in the registration area was 93,421, of which 77,735 were recorded as pulmonary tuberculosis. The surgical forms of tuberculosis do not appear to be so serious as to provide a large mortality rate and this reflects much credit upon the therapeutic effect achieved in so-called surgical tuberculosis.

It is obvious that the main benefits of anti-tuberculosis propaganda have been manifest in the direct reduction of the mortality rate of pulmonary tuberculosis. To illustrate, the death rate of tuberculosis in all forms in 1900 was 200.9 and in 1913 only 147.6. The annual death rate for tuberculosis of the lungs in 1913 was only 122.8, while it averaged 170.7 during the five years 1901-1905.

By way of contrast, the mortality rate for the similar periods from Pott's disease was 1.4 and 1.5, white swelling 0.7 and 0.7, abdominal tuberculosis 5.8 and 6, and tuberculosis of internal organs 2.1 and 2.

It is probable that the indirect effect of anti-tuberculosis work has not resulted in a great decline in the occurrence of surgical tuberculosis, though it must be patent that all hygienic education tending to reduce tuberculosis, as a whole, must necessarily have some force in decreasing Pott's disease, white swelling and visceral tuberculosis.

The great difficulty with the surgical phases of this disease lies in their insidious onset, the misinterpretation of slight and even fleeting symptoms and the readiness with which rheumatism or neuralgia or malaria or laziness are accepted as parental diagnosis and physicians are not promptly consulted. To overcome this careless attitude of the public, a movement is under way providing for a national medical examination day when all people shall be examined with a view to excluding the possibility of tuberculosis infection. The basis of the appeal is to urge an annual physical examination for everyone. It does not contemplate restriction of medical visitation to those actually sick, but provides for the examination of those believing themselves to be in good physical health.

A campaign of this character should awaken employers and employees, parents, teachers, hospital and dispensary physicians, social workers and health officers to the importance, not merely of anti-tuberculosis work, but to the necessity of seeking the maintenance of health, and the freedom from infections of all kinds through systematic and organized efforts in cooperation with the medical profession.

A tremendous advantage will ensue if the co-operating agencies can actually make a distinct impress of their earnestness, enthusiasm and ideals upon the general public. If the work of this medical examination achieves even moderate success, there will undoubtedly be a greater need for the sale of the 200,000,000 Red Cross Seals.

HEALTH INSURANCE.

As a corollary of a compulsory accident insurance, one naturally finds health insurance receiving consideration. The Social Insurance Committee of the American Association for Labor Legislation is recommending a general bill designed to establish health insurance in New York State. The general scope of the measure involves providing, at the joint expense of the worker, the employer, and the State, for health insurance of the worker for his own personal medical care as well as that of his family.

It is the intention, as evidenced in the bill drafted, to have the law applicable to all those engaged in manual labor or in any other field of human activity wherein personal earnings do not exceed a hundred dollars a month. While the insured worker would be provided with medical care which, obviously, includes nursing attendance, hospital

care, medical and surgical supplies, he is also to be the recipient of a cash benefit equal to two-thirds of his wage for a maximum of twenty-six weeks in the year. To wives there is offered special care at childbirth, and if they be insured in addition thereto, a cash benefit for eight weeks. To these two features is added the granting of medical care to the entire family as well as a funeral benefit upon the death of the insured wage earner.

Under the tentative projected plan, it is claimed that these benefits can be secured by workers for virtually the same amount now spent by most of them for funeral expenses. While the premiums or contributions to the funds are to be calculated with reference to wages and cost of benefits on the general lines followed in the British and German systems, the actual contributions are to be equally divided between employers and employees with the State adding one-fourth of the sum thus secured.

While this type of health insurance may not be adopted at the present time, it undoubtedly represents the trend of intelligent social opinion. Few nations in Europe are without the benefits of a health insurance act. The United States in social reforms is conservative and in certain respects distinctly backward. From the standpoint of increasing working efficiency, and stimulating the improvement of factory life and home life, a health insurance act is extremely valuable. To profit by the experience of those nations that already enjoy the benefits of such enactments should be most natural. Wherefore, the consideration of a health insurance act merits the attention of medical men at this time in order that they may have intelligent opinions and definite policies when the time for public discussion calls for their arguments in favor or against the proposition.

THE COOLIDGE TUBE.

The introduction of the Coolidge tube into x-ray therapy has during the past year revolutionized the technique of x-ray therapy and has made possible achievements which were hitherto considered impossible. The Coolidge tube overcomes all of the deficiencies of the older type of tube. By its use it is possible to produce x-rays which approach the gamma rays of radium in their penetrating power. Indeed the harder rays from a Coolidge tube are identical with the lower gamma rays. These hard rays can be produced uniformly as a homogeneous bundle in any quantity desired. The production of such rays can be continued for successive hours without variation in their penetrating power. The heat evolved incident to the generation of such rays does not hinder their production or alter their penetrating qualities. Any desired dose can be quickly and accurately administered. It becomes therefore possible to plan and bring about changes in the ovaries with comparative certainty and, within limits, independent of the age of the patient.—SIDNEY LANGE in *The Ohio State Medical Journal*.

Book Reviews

The Operations of Surgery (Jacobson). Sixth Edition.

By R. P. ROWLANDS, M.S. (Lond.); F.R.C.S., Eng., Surgeon to Guy's Hospital, etc., and PHILIP TURNER, B.Sc., M.S. (Lond.), F.R.C.S., Eng., Surgeon to Guy's Hospital, etc. *In two large octavo volumes*, about 1,000 pages each; 797 illustrations (40 in color). New York: THE MACMILLAN Co., 1915.

It is seven years since the publication of the last edition of this standard English work on operative surgery. With that edition (the fifth) Rowlands collaborated with Jacobson, in place of the previous co-author, Mr. Steward, and wrote the sections on the general surgery of the abdomen. In this edition, written to incorporate the important advances in operative surgery of the past seven or eight years, Jacobson has done none of the revision, Mr. Philip Turner now collaborating in that work with Mr. Rowlands. As before, the operations on the ovary and uterus are described by G. Bellingham Smith.

In the review of the fifth edition we described the general character and plan of this work, which need not here be repeated. The original arrangement of Jacobson into regional divisions has been continued. It has several advantages and some obvious drawbacks. Even more than in the fifth edition, American surgeons have been quoted and their operations described. Nevertheless the work retains, of course, a strong English flavor.

The revision has been quite extensive and thorough, and the work has been greatly improved in appearance.

The treatise is intended no less—rather more—for the novice than for the experienced surgeon, and may be cordially recommended to both.

Oxford War Primers. London: HENRY FROWDE, and HODDER and STOUGHTON, 1915.

The Oxford University Press has issued the following interesting packet primers of war surgery: *Wounds in War*, by D'ARCY POWER; *Wounds of the Thorax in War*, by J. KEOGH MURPHY; *Abdominal Injuries*, by RUTHERFORD MORISON; *Nerve Injuries and Shock*, by WILFRED HARRIS; *Surgery of the Head*, by L. BATHE RAWLING; *Gunshot Injuries of Bones*, by ERNEST W. HEY GROVES; *Injuries of Joints*, by ROBERT JONES; *Medical Hints*, by J. EDWARD SQUIRE. These primers are based on the experiences of the present war as acquired by their authors in military hospitals.

The Stretcher Bearer, by GEORGES M. DUPUY, also from the Oxford University Press, might be included with the "war primers." It is, however, a companion to the R.A.M.C. training book. It is a series of 138 illustrations of litter drill and field litter work and first aid work by litter bearers. Corresponding closely to the litter methods of the U. S. Army it can be studied also by our Sanitary Corps.

Orthopedic Surgery. By EDWARD H. BRADFORD, M.D., Consulting Surgeon to the Children's Hospital, Boston, and the Boston City Hospital; Professor of Orthopedic Surgery, Emeritus, in Harvard University, and ROBERT W. LOVETT, M.D., Professor of Orthopedic Surgery, Harvard University; Surgeon to the Children's Hospital, Boston, etc. *Fifth Edition*. Crown, octavo; 416 pages; 369 illustrations. New York: Wm. Wood & Co., 1915. \$3.75 net.

This popular manual, now in its fifth edition, has been before the profession for fifteen years, and has been justly regarded as the best condensed text-book on orthopedics in English. As such it will continue to serve the purposes of the general practitioner, seeking brief information. It will hardly serve beyond that. Certainly it is inadequate as an exposition of that broader field which modern orthopedic surgeons are rapidly coming to occupy.

Even those seeking condensed information want that information helpful and up-to-date. In their efforts to con-

dense, Bradford and Lovett have sometimes failed to modernize. As a single example, their description of bursitis about the shoulder joint, especially that very common affection—subdeltoid bursitis, gives not a ray of information concerning clinical signs and diagnosis and the treatment recommended might have been copied from any text-book written ten years ago, quite ignoring the important publications of Codman and of Brickner, by whom the pathology of the condition has been established and the clinical course and rational treatment have been described.

The Practitioner's Encyclopedia of Medical Treatment.

Edited by W. LANGDON BROWN, M. D., F. R. C. P., Assistant Physician to St. Bartholomew's Hospital and Physician to the Metropolitan Hospital, and J. KEOGH MURPHY, M.C., F. R. C. S., Surgeon to the Miller General Hospital for South East London and to Paddington Green Children's Hospital, with an introduction by SIR THOMAS CLIFFORD ALLBUTT, K. C. B., M.D., F. R. S. Large octavo; 874 pages. London: Henry Frowde, Hodder & Stoughton. 1915.

This encyclopedia, though containing many excellent articles by men eminent in the medical profession, attempts to present too much subject-matter in a single volume. The result is a very large, heavy, cumbersome book containing a great mass of material, much of which is of little value or interest. For example, the page and a half devoted to "Treatment of Diseases of the Muscles" is little more than a recitation of names and might well have been omitted. In the article on diabetes mellitus, no mention is made of Allen's work and the statement that "a sudden restriction of diet is unjustifiable and involves grave risk of coma" is now known to be absolutely incorrect. Under tests of renal function the discussion of the various methods to be employed is very inadequate and the blood examination (non-protein nitrogen, etc.) is not even mentioned.

That portion of the book dealing with drugs and drug action is more satisfactory and will be found to contain much useful information.

The index, which occupies almost one hundred pages, is excellently arranged.

Habits that Handicap. By CHARLES B. TOWNS. Duodecimo; 289 pages. New York, The Century Company, 1915. Price \$1.00.

Since the introduction of the Boylan law in New York State a considerably increased interest in the drug habit and especially the relationship between the physician and the spread of the habit, has been evident. This little book is therefore very timely, since it lays emphasis on this particular relationship. The author, though not a physician, is especially well situated to obtain a comprehensive view of the entire subject of drug addiction, since he not only at the present time operates an institution in which there are continually a large number of drug users under treatment, but he has also identified himself with the attempts made to lessen the drug evil in other countries.

The book contains a great deal of interesting information and may be read with profit by any physician. Dr. Richard Cabot has written the introduction and therein extols the Towns method of treatment. An appendix to the book contains an article by Dr. Alexander Lambert on the Relation of Alcohol to Disease.

Radiography, X-Ray Therapeutics and Radium Therapy. By ROBERT KNOX, M.D. (Edn.), M. R. C. S. (Eng.), L. R. C. P. (Lond.), Hon. Radiographer, King's College Hospital, London, etc., etc. Octavo; 406 pages; 64 plates, 246 illustrations in the text. New York: The Macmillan Company, 1915. Price, \$8.00.

This is a very complete and comprehensive work. In roentgenology more so than in any other branch of medicine the illustrations are of greater value than the explanatory text, because the interpretation of roentgenograms is of the highest importance in diagnosis. In contradistinction to many other works on radiology, this book presents the halftone illustrated section clear and sharp—a most welcome innovation which every reader and student will enjoy. The technical description of apparatus and

methods of technic is necessarily generalized because no fixed rules regarding use of power machines and exposures can be advanced since every roentgenologist works out an individual technic on individual machines. The section on treatment is one for which there is a great demand. While even in this book the theme is not complete it nevertheless gives the student a fair conception as to what may and may not be treated by the roentgen-ray and radium and how to begin a technic.

While primarily written for the beginner, this work may be heartily recommended to the advanced student because of its wealth of clinical data, clearness of text and typographical excellence.

Modern Biologic Therapeutics. Duodecimo; 322 pages illustrated. New York, *Medical Department of the Lederle Antitoxin Laboratories*, 1915.

The object of this little book, as the preface states, is to furnish a very brief outline of the historic development of medicine and to provide a handy reference compendium on vaccine- and serum-therapy. Types of immunity, methods of immunization, serum diagnosis and vaccine therapy are some of the subjects discussed. The subject matter is well presented and the typography and portraits excellent.

The Meaning of Dreams. By ISADOR H. CORIAT, first assistant visiting physician for diseases of the nervous system, Boston City Hospital; instructor in neurology, Tufts College Medical School. Duodecimo; 194 pages. Boston: *Little, Brown and Company*, 1915. \$1.00.

This small book is an exposition of dreams from the strict Freudian viewpoint.

Books Received

A Mechanistic View of War and Peace. By GEORGE W. CRILE. Edited by AMY F. ROWLAND. Small octavo; illustrated. New York: *THE MACMILLAN Co.*, 1915.

Field Hospital and Flying Column. Being the Journal of an English Nursing Sister in Belgium and Russia. By VIOLETTA THURSTAN. Duodecimo; 184 pages. London and New York: *G. P. PUTNAM'S SONS*, 1915.

Oral Surgery. A Treatise on the Diseases, Injuries and Malformations of the Mouth and Associated Parts. By TRUMAN W. BROPHY, M.D., D.D.S., LL.D., Sc.D., F.A.C.S., President and Professor of Oral Surgery, Chicago College of Dental Surgery, etc., etc. With special chapters by other authors. Large octavo; 1,000 pages; 909 illustrations, including 39 color plates. Philadelphia: *P. BLAKISTON'S SON & Co.*, 1915.

Text-Book of Nervous Diseases for the Use of Students and Practitioners of Medicine. By CHARLES L. DANA, A.M., M.D., LL.D., Professor of Nervous Diseases, Cornell University Medical College, etc., etc. *Fifth Edition.* Crown octavo; 632 pages; 262 illustrations, including four plates. New York: *Wm. Wood & Co.*, 1915. \$4.25 net.

Sleep and Sleeplessness. By H. ADDINGTON BRUCE, author of "Scientific Mental Healing," etc. Duodecimo; 218 pages. Boston: *LITTLE, BROWN & Co.*, 1915. \$1.00.

Infant Health. A Manual for District Visitors, Nurses and Mothers. By J. CAMERON MacMILLAN, C.M.B., A.R.S.N.I. Duodecimo; 128 pages; illustrated. London and New York: *OXFORD UNIVERSITY PRESS*, 1915. 75 cents.

Progress in Surgery

A Résumé of Recent Literature.

Roentgen Studies after Gastric and Intestinal Operations. J. T. CASE, Battle Creek, *Journal of the American Medical Association*, November 6, 1915.

Post-operative findings after gastric and intestinal operations as revealed by roentgenography in several classes of cases are described by Case. The conditions specially observed are, first, acute small bowel obstruction following operation, and the study is made with special reference to the advisability of surgical interference. The same is done with the findings after gastro-enterostomy, appendectomy, and ileocolostomy, with and without colectomy. He describes the method of taking roentgenograms on a 17 by 17 inch plate with an intensifying screen in a flash exposure. This last must be short enough so that it may take place while the patient is holding his breath. The plates will reveal at once any gas distention of the bowel and its locality in the large or small intestine. Observation of the cecal region is especially helpful, for if the cecum contains gas it is not likely that the obstruction is in the small bowel. The location of the abdominal shadow will also be shown in other portions of the intestine. If the findings at first are not decisive a small amount of barium sulphate may be administered by the mouth, but this is not often necessary after a little experience with the method. After gastro-enterostomy these studies show at least three classes of patients. First, those in whom the gastro-enterostomy opening is very large. These patients frequently complain of a sickening distress, especially after taking warm liquid. In the second class the stomach does not empty readily. The opening is apparently too high or too far from the pylorus. The normally functioning cases form the third class. Unless the operative procedure has been done for the relief of pyloric organic obstruction it is the rule to find some of the barium passing through the pylorus. The nearer the stoma to the pylorus the less barium passes through the latter. Case mentions the apparent formation of a sphincter or contraction ring in the jejunum a little below the opening, which has been noticed also by Cannon and Kocher. Another new point he mentions as occurring after gastro-enterostomy is a stagnation of food apparently in the small bowel at the site of the anastomosis and accounted for by the inhibition of onward peristaltic activities. After appendectomy a common cause of cecal stasis is adhesions which persist even several years in some cases, and he suggests the desirability of including the least possible amount of cecal muscularis in the invaginating suture. A large number of cases have been examined after ileocolostomy in which the symptoms have recurred and have been worse than before operation. There is a retrograde peristalsis and an ileostasis in these cases and to avoid this ileostasis Kellogg has endeavored to make an artificial ileocolic valve, and in his later cases with some measure of success. From his observations, Case concludes that when a partial colectomy is required and a new ileocolic junction is made the ileum should be implanted as near as possible to the proximal end of the remaining portion of the colon and an effort be made to produce an artificial ileocolic valve.

Pathogenesis of Spontaneous and Experimental Appendicitis, Ulcer of the Stomach and Cholecystitis. EDWARD C. ROSENOW, Rochester, Minn., *The Journal of the Indiana State Medical Association*, October 15, 1915.

Rosenow briefly reviews his work on animal inoculation of streptococci obtained from human appendicitis, gastric ulcer and cholecystitis. His figures show that in each of these diseases, the organisms, when injected intravenously, caused in animals lesions of the same organs as had been affected in man. Thus in 68 rabbits injected with cocci from appendix cases, 68 per cent. of the animals showed lesions in the appendix. Eighteen strains from ulcers of the stomach or duodenum produced in rabbits lesions of these same organs in 74 per cent. of the 103 animals injected.

"From these results the conclusion seems warranted that appendicitis, ulcer of the stomach and duodenum, and cholecystitis are largely embolic infections from some distant focus of infection, or even from the more or less normal intestinal tract, by streptococci or other bacteria having elective affinity for these structures, and that the simultaneous presence of two or more of these diseases in the same individual is in the beginning due more often to this cause and not so often to infection by continuity or by way of the lymphatics. Finally, since these bacteria can be made to shift in their localization by cultivation on artificial media and by animal passage, and because the peculiar affinity of the strains in the focus is present only at the time of the attack, it is highly probable that the so-called focus of infection is not only the place of entrance but the place where opportunity is afforded for bacteria to acquire the various affinities necessary to infect. Hence the importance of a thorough search for the presence of foci of infection and their eradication if possible. In other words, the presence of appendicitis and especially of ulcer of the stomach and duodenum and cholecystitis are to be considered good evidence for the existence of some distant focus of infection, and, because these lesions may act as secondary foci, drainage or surgical removal of the diseased tissue, if this can be done with little risk, is undoubtedly a most rational treatment."

A Review of One Thousand Operations for Appendicitis. WILLIAM D. HAGGARD, Nashville. *Southern Medical Journal*, November, 1915.

In a statistical study of 1,133 operated cases of appendicitis, the author makes the following observations: There was a mortality of $2\frac{1}{2}$ per cent., all of the fatal cases being of the perforative variety with spreading peritonitis. The records prove conclusively the fatality of delaying operation. There was no death in the series of acute appendicitis in which the disease was still confined to the appendix. The author agrees with Murphy in that "it can be laid down as a law, if a case of appendicitis has pus outside of the wall of the appendix at the time of operation, it has been improperly treated up to that date." This series, as those of many others of much larger scope, shows the uniform parity of results in the early acute cases, as in the so-called interval cases that have been obliged to go through the hazard of an attack without operation.

The most frequent mistake in diagnosis was the confusion of appendicitis with intestinal obstruction.

Practically every case with perforation and gangrene, gave a history of having received catharsis.

The author decries the ice-bag as a curative agent. He believes that leucocytosis is an aid in the diagnosis since "it is extremely rare to find any case of acute appendicitis that does not show from 8,000 to 15,000."

The indications for operation are given as follows: "Operate as early as possible in the disease, within the first twenty-four hours, if possible; in the second twenty-four, if we must; in the third twenty-four, if the condition of the patient seems to warrant it, and thereafter, in practically all cases who have had the drainage that purgatives and food give and whose symptoms yet indicate that operation may be beneficial."

The Transverse Abdominal Incision. WILLY MEYER, New York. *The Annals of Surgery*, November, 1915.

Meyer carried out in a number of cases the transverse abdominal incision as originally recommended by Sprenghel and as advocated by Perthes and by Moschcowitz.

The skin, fascia and muscles and peritoneum are divided transversely. This procedure permits a wide exploration and presents the abdominal viscera with ease and rapidity. The wound is closed layer by layer, the resultant scar is firm, the approximation of these layers is frequently accomplished with very little difficulty. An additional advantage of this incision lies in the fact that retention sutures are never required since the tendency of the abdominal wall, in case of straining, is to bring closer together rather than to separate the borders of the wound.

Stones in the Ureter. W. F. BRAASCH, and A. B. MOORE, Rochester. *Journal of the American Medical Association*, October 9, 1915.

Braasch and Moore have analyzed 654 cases of lithiasis operated on at the Mayo Clinic up to June 1, 1915, in which 363 stones were removed from the kidney and 230 were found lodged somewhere in the ureter. To this number should be added sixty-four cases in which a stone in the ureter was either removed by cystoscopic manipulation or passed immediately after. The authors discuss in this analysis the diagnosis, the localization of pain and the occurrence of vesical irritability, which are the principle guides. Pain arises from two conditions: intrarenal tension from obstruction, and localized infection. Stone in the ureter does not usually cause pain localized in that area. In their cases pain was referred to the renal area largely in 67 per cent. of the cases, the upper abdominal quadrant in forty-five, or 15 per cent., and to the lower ureter in 9 per cent., also in three cases to the suprapubic area. In sixteen cases no definite radiation of pain was reported and no pain whatever in five. This shows, therefore, that an exploratory incision or a Roentgenogram would fail to disclose the lesion and how confusion with lesions of the upper abdomen might follow. It is probable that this group of cases is most frequently confused with appendicitis, especially when the pain is on the right side, and when the urine analysis is negative. The lower abdominal localization is usually the result of ulcerated kidney and subsequent periureteritis. A stone may exist a long time in the ureter without pain. The various radiations of pain are noted and in some cases have led to operations on a false diagnosis. Vesical irritability was reported in 74 per cent., and is so common that its absence is of distinct value in differential diagnosis. This is especially true when the stone is lodged in the vesical portion of the ureter. The presence of a few red blood cells or pus cells has been overestimated with regard to a diagnostic sign, but should lead to a careful search by cystoscopic and other methods. Their absence should not exclude the possibility of stone. Gross hematuria should be regarded as a symptom of less importance with ureteral stone than with kidney stone. Stone in the ureter is rarely palpable through the abdominal wall, but the authors say that their attention has recently been called to the value of palpation through the vagina or rectum when stones are lodged in the lower end of the ureter. As regards treatment, the renal origin of the stones should be borne in mind. In all probability, the majority of stones in the ureter pass spontaneously, and surgical interference is seldom indicated in the first attack. Before an abdominal operation is attempted the passage of the stone may be aided by the various methods offered by endoscopic technic, namely, catheter manipulation, injection of steryglycerin or oil fulguration, ureteral dilatation and ureteral forceps. They believe, however, that many of the stones which can be thus removed will be passed spontaneously after dislodgment by means of the ureteral catheter. A greater percentage of error in the roentgenographic diagnosis will result from incorrect interpretation than from failure of the ray to show the stone. An ideal roentgenogram in every case is impossible, however. The shadow of the pelvic bones may obscure that of an overlying stone. The degree of obstruction is not dependent on the size of the stone and a pinhead concretion may be entirely overlooked. Whether or not a stone is shown in the plate depends largely on the calcium content. Nearly 75 per cent. of stones occur in the lower third of the ureter with little difference on either side. Stones are usually single. Stones may change their position and may pass out without detection without having been correctly diagnosed. It is clear, however, the authors say, that a high degree of accuracy is possible if all the means at disposal are employed.

Stone in the Kidney and Ureter. A Critical Review of 157 Cases. H. CABOT, Boston. *Journal of the American Medical Association*, October 9, 1915.

It appears that the greatest number of patients come to operation between the ages of 20 and 40, but the onset of symptoms undoubtedly occurs at a much earlier period.

Many cases begin between 10 and 20, and the largest number between 20 and 30. In this series the men predominated, 108 to forty-six women, which does not agree with some other figures. In the women the right side was more frequently involved, and the left side in men. The frequency of involvement of the right side in women has been commonly explained by the more frequent occurrence of mobility of the right kidney. Colicky pain occurred in ninety-six patients at some time, but was the presenting symptom in only fifty; in the remaining cases dull pains, variously distributed, and hematuria, chills and fever, and vomiting, were the rule. In 150 cases there was albumin in 111, blood, either microscopic or macroscopic, in 103, and pus in 109. Six per cent. gave negative roentgenograms, but he considers this will be the case in from 10 to 15 per cent. of all cases. There were 140 operations with five deaths, pyelotomy being at present the operation of choice. From the total study, in which Cabot sums up practically the above, he concludes that urine and the Roentgen ray are unsafe guides for operation, but unusual pain, together with a negative Roentgenogram and a persistently normal urine is fortunately rare.

Renal Pain: Diagnostic and Clinical Significance.

J. BENTLEY SQUIER, New York. *International Journal of Surgery*, October, 1915.

Four main pathological conditions are apt to be confounded with renal lesions because of the accompanying pains; these are (1), Coincident disease of the gall-bladder and ducts; (2), Gastro-duodenal ulcer syndrome; (3), Appendicitis; (4), Diseases of the large intestine.

Three points deserve consideration in renal pain—the type of the pain, its original site, its final location and path of radiation. The type of pain may be of two kinds, (a) true, renal pain situated in the flank and lumbar regions, constant in character, dull, and without radiation; (b) pelvic or urethral pain, diffusely located, colicky in quality, intermittent in character, radiating through the inguinal region into the genitalia and rectum. If with one or the other type of pain there is also pus or blood, or gravel in the urine there is then barely any doubt that the pain is of renal origin. An interesting peculiarity of renal pain is that it never becomes paroxysmal; it is always dull and constant and nearly always accompanied by local tenderness, Murphy's sign or Thompson's sign or costovertebral tenderness.

New Growths of the Prostatic Urethra in Relation to

Tuberculosis. P. S. PELOUZE, Philadelphia, *New York Medical Journal*, October 16, 1915.

During the past two years, Pelouze has observed nine cases, in which urethroscopic examination revealed a peculiar finding in the prostatic urethra. This finding was associated with a tuberculous condition elsewhere in the body. It consists in growths confined to the roof and lateral walls of the urethra. They ranged from one-quarter to one-twelfth the size of the average verumontanum; they were pale, generally arranged in clusters, and were either moderately pedunculated or sessile. Tiny blood-vessels can usually be seen coursing over the surface. The patients nearly always complained of increased frequency of urination, burning pain at the vesical neck, and ardor urinae. In nearly every instance tubercle bacilli could be demonstrated in the urine. Pelouze believes that when this condition is demonstrable, it is almost pathognomonic of tuberculosis.

Epididymis-vas Anastomosis for Sterility. W. F. BERNART, Chicago, *New York Medical Journal*, October 23, 1915.

The commonest cause of Sterility in the male is occlusion at the head of the epididymis. This occlusion, however, does not involve the efferent ducts, so that an anastomosis between the patent ducts of the epididymis and the testis has been frequently proposed. The lack of success of this operation is due to the fact that the wound in the head of the epididymis heals too rapidly. To obviate this, Bernart introduces a silver wire looped in the middle into the lumen of the vas deferens. The loop being placed so that it engages into the wound in the head of the

epididymis. The other end of the wire is allowed to protrude through the skin. The anastomosing sutures are introduced before the wire is inserted and then drawn tight. In four of the author's eight cases, the wives became pregnant shortly after the operation.

The Treatment of Joint Infections by Lavage and Direct Medication. JOHN W. CHURCHMAN, New Haven. *Annals of Surgery*, October, 1915.

Churchman in 1912 and again in 1913 showed that anilin dyes can be used to prevent the growth of bacteria which belong in the Grave positive group. He pointed out that gentian violet, specifically, even in dilutions of 1 to 100,000, inhibits the growth of what corresponds to the Grave positive group of bacteria; these he named "gentian negative"; organisms that grew in the presence of dye he designated as "gentian positive." Moreover, air-contaminating organisms also refused to grow in the presence of gentian violet.

With this work firmly established, Churchman attempted to treat suppurating joints by irrigating with gentian violet solutions. He first lavaged the joint to remove the secretions from the synovial membrane, which would act as a coating of grease and so prevent the proper action of the dye. Accordingly, he built an irrigating apparatus with a reversible rotary pump so that suction as well as positive pressure might be attained. Proper tanks contain respectively saline solution, 2 per cent. novocaine solution and gentian violet solution. The apparatus is autoclaved. An aspirating needle is introduced into the joint cavity, the fluid is aspirated, and the joint irrigated. It is then flushed with gentian violet solution.

By this method he has treated a number of suppurating joints. The dye produces no toxic results. It may be used, safely, as strong as 1 to 1,000. Churchman states that the results from this method of treatment are sufficiently encouraging to warrant further trial.

Observations on Birth Fractures of the Humerus from the Wards of the New York Lying-In Hospital.

E. D. TRUESDELL, New York. *Archives of Pediatrics*, September, 1915.

The author describes his observations on twenty-four fractures of the humerus. He concludes that a temporary paralysis of the musculo-spiral nerve is usual, that displacements of the fragments always occurs, the variety of the displacement and the degree of deformity being known only by means of the radiograph, and that while every effort should be made to combat this deformity, Nature will so supplement treatment of these cases as to ensure satisfactory results, eliminating deformities during the first two years of life that would be both permanent and disfiguring in adults. After trying various more complicated methods of immobilization, Truesdell advises simply fixing the forearm close to the body by means of a broad swathe of adhesive plaster, the elbow being flexed and the hand being placed on the opposite shoulder. The article is illustrated with numerous Roentgen-ray photographs.

Juvenile Deforming Osteochondritis of the Hip. G. J.

MCCHESNEY, San Francisco, *Journal of the American Medical Association*, November 6, 1915.

Brief histories of three cases of the juvenile deforming osteochondritis of the hip (the name given by Perthes) are given by McChesney. He briefly defines the condition as a progressive destruction and crushing, principally of the upper femoral epiphysis, characterized by a slight limp, mild subjective symptoms, a fairly constant limitation of abduction, and a benign course with complete recovery and little or no treatment. The etiology seems not connected with any special trauma, and the disease occurs when the child is in good health during the second five years of life. The limp may last from two to four years and then lessens in spite of greater destruction of the epiphysis, as shown by the roentgenogram. The limitation of abduction is next in importance and grows about parallel with the limp. There is almost always reported also a slight limitation of in- or out-rotation. Slight shortening and atrophy are occasional symptoms and pain is almost negligible. The

Roentgen-ray findings are distinctive, the progressive flattening of the epiphysis, slight at first, increases until the epiphysis, instead of being rounded, is reduced to a flattened plate or disk, often divided into two or three parts which later appear to fuse and finally unite with diaphysis. To distinguish it from tuberculosis the von Pirquet test can be considerably depended on, together with the clinical symptoms. Juvenile deforming arthritis is usually accompanied with crepitus, severe pain, and considerable stiffness and limp. The joint cartilage is intact. In coxa vara the roentgenogram and the von Pirquet test are our only tests, but they should be sufficient. In acute arthritis the fever, general limitations of motion, and acute onset are characteristic. The roentgenogram would show no change. Acute osteomyelitis should present no difficulty. McClesney believes that weight bearing has its influence in the etiology and the child should be protected from this cause.

A Resection of the Transverse Process of the Fifth Lumbar Vertebra for the Relief of Painful Back.
WALLACE BLANCHARD and CHARLES PARKER, Chicago.
The American Journal of Orthopedic Surgery, October, 1915.

These authors state that there is seen occasionally a condition of severe pain in the back caused by an impingement of the transverse process of the fifth lumbar vertebra upon the posterior wing of the ilium, producing numbness and paralysis of the side and the leg—the patient becomes bed-ridden because of the severity of the condition.

They report such a case in a woman thirty-seven years old who had had spondylitis of the lower dorsal vertebrae ten years before and who recently developed pain in the left lumbar region and the left leg. For this she had had several laparotomies performed with no relief. A radiograph showed the left transverse process of the fifth lumbar vertebra enlarged. This process was detached at operation, care being taken to avoid injuring the nerve trunks. Within three days the patient was about and walking with apparent comfort.

Revisions of Amputations—to be Avoided. (*Zur Vermeidung von Nachamputation.*) HANS HANS, *Zentralblatt für Chirurgie*, June 9, 1915.

Hans advises strongly that amputation stumps are not to be revised unless there really is no other alternative. Every inch of the limb spared is of inestimable value. Where, as frequently occurred in Hans' war surgery experiences, patients were brought to the base hospital whose limbs had been amputated in the field units and whose wounds had broken down—he seldom resorted to revision of the stump. Instead the wound was freshened, scar tissue removed, and an anchored skin flap, with subcutaneous tissue attached, obtained from the most convenient limb and sutured to the bare area of the stump. Ten or twenty days later the flap was divided and Thiersch skin grafts placed wherever necessary. He found it convenient to first make a paper pattern of the size and outline of the required flap before planning it on the normal limb.

The Value of Hypochlorous Acid in the Treatment of Cases of Gas Gangrene. JOHN FRASER, Edinburgh,
British Medical Journal, October 9, 1915.

Fraser reports eight undoubted and seven cases with only one death. The procedure is the following: After extensive incision of the infected area, the wound is irrigated thoroughly with a 1/2% solution, and dressed with gauze soaked in this solution. Dressing at first is every few hours; at the end of a day or two, less frequently. Fraser gives temperature charts showing the prompt fall after the treatment is instituted.

The Use of Quinine in the Treatment of Experimental Gaseous Gangrene. KENNETH TAYLOR, American Ambulance, Paris. *The Lancet*, September 4, 1915.

The conclusions reached by Taylor in a large series of experiments are the following:

Quinine has shown a marked bactericidal tendency against the gas bacillus, inhibiting its growth in vitro where it was ten times as effective as carbolic acid, and reducing the

mortality from gas gangrene in animals from 100 to 41 per cent.

Quinine has shown strong laboratory evidence of value as a general antiseptic, being especially effective in a menstruum of pus.

Amputation of the Great Toe, With Remarks on the Muscular Physiology of the Lower Extremity.
J. C. SCHAPPS: *Butte Medical Record*, September 25, 1915.

According to Schapps, the flexor and extensor tendons of the great toe have, as one of their main functions, the raising of the heel when the toes are upon the ground. This explains the severe disability accompanying the loss of the great toe. To obviate this, Schapps conceived the idea to save these tendons, and unite them over the end of the metatarsal bone. This operation was carried out in one case by Dr. McCarthy, with a perfect functional result.

The Sesamoids of the Flexor Brevis Hallucis; their Importance. A Surgical Precaution. N. P. BARNES, Washington, *New York Medical Journal*, November 6, 1915.

Barnes holds that the surgical importance of these little bones is not sufficiently recognized. They are frequently irritated, injured or even fractured as the result of trauma, usually following dancing. They frequently result in cellulitis, tenosynovitis, periostitis, tissue thickening and sometimes exostoses. Rest, as a rule, affords temporary relief; but in order to obtain permanent relief Barnes advises thick-soled shoes, with the sole hollowed out just beneath the site of these sesamoid bones. In some instances, removal of these bones is necessary, especially if there is fracture or exostosis.

Parapharyngeal Abscess as Distinguished from Retro-pharyngeal and Peritonsillar Abscesses. HENRY HEIMAN, New York. *American Journal of Diseases of Children*, August, 1915.

Heiman differentiates para- from retro-pharyngeal abscess. The former occurs especially in children, and its site is in the lateral columns, that is, by the side of the pharynx. The origin of this abscess is from the superior chain of the deep cervical glands, which are situated along the course of the carotid artery, as distinguished from the retropharyngeal glands, situated in the circumscribed retro-pharyngeal space, just lateral to the midline and in front of the prevertebral vessels. These abscesses are, as a rule, cured by external operation.

The Surgical Anatomy of Cleft Palate. J. R. EASTMAN, Indianapolis. *Journal of the American Medical Association*, September 11, 1915.

Eastman writes on the surgical anatomy of cleft palate, first describing its blood supply and the necessity of avoiding injury of the palatine vessels. He notices particularly the caution that should be exercised in making lateral incisions for the elevation of flaps, and says all the well-known evil effects of hemorrhage may be avoided with considerable certainty by the simple expedient of avoiding lateral incisions, or, if such are absolutely necessary, making them after the flaps have been elevated and the lines of tension determined so that only small incisions properly placed are required. In case of a very high arch of the hard palate with narrow cleft it may seem advisable to elevate the hard palatal flaps through a lateral incision. It should be just large enough to admit the raspator or knife blade and, of course, the principal vessels must be carefully avoided. Two of the larger palatal nerves, the anterior palatine and middle palatine from Meckel's ganglion, correspond to the two divisions of the descending palatine artery and would be endangered by an incision of the vessels. The muscular nerve branches would be divided by a lateral incision dividing the palatal muscles. Another objection to the lateral incision is that if a flap attached only by its anterior and posterior extremities becomes strangulated or sloughs, a large amount of tissue is

lost and a second operation, if needed, is difficult or impossible. To elevate flaps by beginning at the borders of the cleft is, as a rule, not so difficult as to raise the flaps through a lateral incision. Other objections to the use of such incisions and how to avoid them are offered.

Transplantation from Sternum for Skull Defects.
(*Deckung von Schädeldefekten aus dem Sternum.*)
PAUL MÜLLER, Ulm. *Zentralblatt für Chirurgie*, June 5, 1915.

Autoplastic repair of skull defects has not seemed feasible to the author, because it is very difficult to obtain a proper bone transplant of even thickness and because the brain might be injured from the hammering required to chisel out the transplant. He thought of the sternum as an available bone for a transplant, since the sternum is readily reached and since its spongy structure permits the easy excision of a fragment several millimeters in thickness.

He advises that preliminarily a pattern be cut out of sterile paper to cover the size and shape of the skull defect. The paper will then serve as an accurate guide in securing the necessary transplant. The edges of the skull defect should be freshened and the sternal fragment placed with its periosteal surface outward.

Müller had excellent results in two cases where sternal transplants were used.

Brain Lipoid as a Hemostatic. ARTHUR D. HIRSCHFELDER, Minneapolis. *The Lancet*, September 4, 1915.

Hirschfelder has experimented with lipoid substances to find a hemostatic. Following the suggestion of Howell that "fibrin ferment" so-called, is really not a ferment, but a lipoid which seems to be identical with the diphosphatide "Kephalin," Hirschfelder made extracts of ox-brains as follows: The brain was covered with three volumes of alcohol, shaken, the alcohol then being poured off. The residue is extracted with ether, shaken, filtered and the filtrate evaporated to dryness. A yellow residue remains, consisting largely of Kephalin.

When this substance is smeared over a bleeding area, a very firm clot forms in from one to two minutes. The author describes various experiments in which the substance proved itself an excellent hemostatic. He advocates its use in warfare, commenting on the ease and cheapness with which it may be produced.

Epidural Injection. (*Epidurale Injektion.*) WALTER ENDERLE, Berlin-Schöneberg. *Deutsche Medizinische Wochenschrift*, August 12, 1915.

Enderle has had very satisfactory results with epidural injections in long standing cases of sciatica where other forms of treatment have been of small avail. He injects about 20 c.c. of sterile normal saline solution into the sacral canal. The patient is placed in the knee-elbow position, the needle (with a 20 c.c. Record syringe attached) is introduced about $\frac{1}{2}$ c.m. externally to the midline, and the sacral foramen is entered. No injurious results have followed this procedure. In about 90 per cent. of cases treated improvement was marked. The technic is not difficult.

Employment of Bandages for the Irrigation of Wound Surfaces with Therapeutic Solutions, and the Draining of Wounds. SIR ALMROTH E. WRIGHT. *The Lancet*, October 16, 1915.

The use of bandage strips to irrigate wounds has the following advantages over wet dressings: (1) A therapeutic solution can be brought into direct contact with the wound, and its concentration can be maintained, unaltered. (2) The therapeutic agent may be applied to all the internal and external surfaces of the wound, and at the same time ideal drainage may be maintained. Wright uses strips of ordinary bandage to conduct the fluids out of the wound (by capillary attraction) and then to convey them to a receptacle by siphonage. By various ingenious simple contrivances the author modifies his technic so that wounds of various shapes, sizes and locations may be made amenable to this treatment. In funnel-shaped wounds

strips of bandage extend from the bottom along the walls, radiating outward like the petals of a flower, with the result that not only the bottom of the wound (as is usually the case) but also every part of its walls, is bathed with the irrigating solution. In order to carry the strips to their proper places rubber tubes with wires in them are used to convey the bandage to the wound.

The article is illustrated with a number of figures showing the arrangement of the drainage in all the various types of wounds.

A Clinical Study of Two Hundred and Twenty-eight Children in Relation to Tuberculous Exposure Controlled by the von Pirquet Test. J. B. MANNING and H. J. KNOTT, Seattle. *American Journal of Diseases of Children*, November, 1915.

The authors conclude that children living in tuberculous surroundings and those with no known contact with consumptives show marked differences; those living in a tuberculous milieu reacting in a ratio of about 2 to 1 to those living in an environment not known to be tuberculous. The number of positive reactors in the entire series was 42.9 per cent. In children 10 to 15 years of age, the majority of whom live in tuberculous surroundings, only 58.1 per cent. showed positive reactions. This is far below the figures of Hamburger or those of von Pirquet, who found 95 and 93 per cent., respectively, affected. The authors believe that this discrepancy is due to the better housing and sanitary conditions in Seattle as compared with Vienna.

The Suprarenal Gland in Shock. J. F. CORBETT, Minneapolis. *The Medical Press and Circular*, September 15, 1915.

After a review of the various theories proposed to explain surgical shock, the author concludes that shock is a composite, in which epinephrin exhaustion and oligæmia are predominant factors. Anesthesia, fright, pain and trauma are immediate agents in producing epinephrin exhaustion as well as shock.

In a long series of animals reduced to traumatic shock by the usual methods, a great epinephrin exhaustion was found to exist. In this series the final appearance of the animal was that of complete shock—mental apathy, evidenced by unconsciousness with no other, muscular relaxation, pale mucus membranes and low blood pressure. The average blood pressure was 12 and the epinephrine content 8 per cent. The average time to produce complete shock was six hours. In animals in which the suprarenal glands had been removed, it took only 1.3 hours of traumatization to produce shock. Further than this, animals in whom the epinephrin content had been reduced by sciatic stimulation, but in which shock had not become manifest, very rapidly went into shock after a few minutes of peritoneal trauma. Symptoms of shock become extreme with great suprarenal depletion.

A Clinical Study of Actinomycosis. V. ZACHARY COPE, London. *The British Journal of Surgery*, July, 1915.

Cope claims that actinomycosis is not as infrequent a disease as one generally assumes it to be. It is quite common in London with its vicinities. Often the condition is overlooked or wrongly diagnosed—perhaps as sarcoma, or a septic or a luetic infection. Actinomycosis should always be considered as a possibility when there is a newly formed subacute or chronic swelling in the region of the mouth, face, neck, thorax, or right side of the abdomen. (Pus from every abscess should be examined—as a matter of routine.)

There are two types of the disease clinically, the hard and the soft, the latter type softened after two or three months. The hard variety is most frequently seen as a firm, peri-buccal infiltration, quite characteristic in appearance.

Treatment by surgical measures, with the use of iodides and vaccine therapy, promises results in some cases. The author appends a list of thirteen actinomycosis cases that were in his care.





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